

**Bodoland University**  
**Curriculum Structures for UG syllabus**  
**BCA (Bachelor of Computer Application)**

**Revised in Year 2021**

**REVISED PROGRAM STRUCTURE AND DETAILED CURRICULUM  
IN THE L-T-P-C FORMAT**



**BODOLAND UNIVERSITY**  
**DEBARGAON, KOKRAJHAR(B.T.R.)**

**BODOLAND UNIVERSITY**  
**BCA (Bachelor of Computer Application)**  
**Year - 2021**

**The course will be a 3 year- 6 semester course.**

**Eligibility:** The candidate must have passed Higher Secondary or equivalent level examination from Science/Commerce/Arts Stream. Students who have passed the Higher Secondary examination with either Mathematics or Computer Science as one of the subjects obtaining minimum pass mark in the subject should be given preference at the time of admission. Students completing Diploma in CSE/IT from AICTE recognized institutes are also eligible for taking admission. The Colleges may have their own cut-off marks which they found to be reasonable for them and/or hold admission test for the final selection of candidates. Colleges may offer Bridge Course in Mathematics at 1<sup>st</sup> semester for admitted students who did not have Mathematics at the HS level.

**Examination:** The marks obtained by a student in Bridge Course (if any) and Paper 2.6 i.e. Environmental Studies will not be counted in his/her semester grade point average (GPA), but he/she will have to obtain the minimum pass marks in these papers in order to clear the 1<sup>st</sup> and 2<sup>nd</sup> semester respectively. The **L-T-P-C** break- up for the courses has been mentioned below with each course. Each paper will carry a total of 6 credits except the courses 2.6 (Environmental Studies) and 6.3 (project work) which will carry 3 credits and 18 credits respectively. For the theory papers, 1 credit point corresponds to one lecture / tutorial per week and for practical papers 1 credit point corresponds to 1 practical session (of at least 2 hours) per week. Bridge Course Examination will be conducted by the concerned college itself (if any) with prior discussion with Controller of Examination Office.

All matters related to examinations including internal evaluations will be as per the regulation of TDC for semester system of B.U. with choice based credit and grading system.

SL. NO.	CORE COURSE(14)	ABILITY ENHANCEMENT COURSE(AECC)(2)	SKILL ENHANCEMENT COURSE(SEC)(2)	ELECTIVE: DISCIPLINE SPECIFIC(DSE)(4)	ELECTIVE: GENERIC(GE)(4)
	C1: Computer fundamental & ICT Hardware (4+4lab)	AECC:1 (English/Hindi /MIL Communication)			GE:1 (a) Computer Fundamentals (b) System Administration and Maintenance
	C2: Introduction to C Programming (4+4lab)				
II	C3: Mathematics-I	AECC:2 Environmental Science			GE:2 (a) Introduction to Programming (b) Programming in Python
	C4: Data Structure & Algorithm (5+1lab)				
III	C5: Computer based Accounting & financial Management(4+4lab)		SEC1: Oracle(SQL/PL-SQL)		GE:3 (a) Computer Networks and Internet (b) E-Commerce Technologies
	C6: Digital Logical Fundamentals				
	C7: Mathematics-II				
IV	C8: Software Engineering		SEC2: UNIX/LINUX Programming		GE:4 Multimedia and Applications
	C9: Computer Organization and Architecture				
	C10: Data Base Management System(4+4lab)				
V	C11: Object oriented Programming in C++(4+4lab)			DSE1: Digital Image Processing	
	C12: Operating System (5+1lab/Tutorial)			DSE2: Numerical Methods	
VI	C13: Web Technology(4+4lab)			DSE3: System Programming	
	C14: Computer Networks and Internet			DSE4: DISSERTATION/PROJECTWORK	

SEM-I						
Paper Code	Course	L+T+P	Credit	EndSem	Int	Total
BCA-101G	C-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
BCA-102G	C-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-GE-103G	GE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20 20	100
COMM-104GR	AECC-1:English/Hindi/MIL(Communication)	5+0+0	6	60(L)	20	100
<b>Total-</b>			<b>20</b>	<b>290</b>	<b>60</b>	<b>400</b>

SEM-II						
PaperCode	Course	L+T+P	Credit	EndSem	Int	Total
BCA-201G	C-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-202G	C-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-GE-203G	GE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
ENV-204GR	AECC-2: Environmental Science	4+1+1	6	60(L)+20(P)	20	100
<b>Total-</b>			<b>24</b>	<b>290</b>	<b>60</b>	<b>400</b>

SEM-III						
Paper Code	Course	L+T+P	Credit	EndSem	Int	Total
BCA-301G	C-5	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-302G	C-6	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-303G	C-7	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-SEC1-304GR	SEC-1	2	2	50(L)		50
BCA-GE-305G	GE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>26</b>	<b>370</b>	<b>80</b>	<b>450</b>

SEM-IV						
Paper Code	Course	L+T+P	Credit	EndSem	Int	Total
BCA-401G	C-8	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-402G	C-9	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-403G	C-10	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-SEC2-404GR	SEC-2	2	2	50(L)		50
PHY-GE-405G	GE-4	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>26</b>	<b>370</b>	<b>80</b>	<b>450</b>

SEM-V						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA-501G	C-11	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-502G	C-12	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-DSE1-503G	DSE-1	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-DSE2-504G	DSE-2	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>24</b>	<b>320</b>	<b>80</b>	<b>400</b>

SEM-VI						
Paper Code	Course	L+T+P	Credit	End Sem	Int	Total
BCA-601G	C-13	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-602G	C-14	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-DSE3-603G	DSE-3	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
BCA-DSE4-604G	DSE-4 (Project/Dissertation)	4+0+2 5+1+0	6	60(L)+20(P) 60(L)+20(T)	20	100
<b>Total-</b>			<b>24</b>	<b>320</b>	<b>80</b>	<b>400</b>

1. Where there is a practical there will be no tutorial or vice-versa.
2. Institutes should evolve a system/policy about ECA/General Interest/Hobby/Sports/NCC/NSS/related courses on its own.
3. **Skill Enhancement Courses (SEC):** These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode so as to increase their employability. The list provided under this category are suggestive in nature and each Institution/College has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need. However, in this case approval of Academic section of the University is mandatory.

## DETAILED SYLLABUS

### SEMESTER –I

#### BCA.C1.COMPUTER FUNDAMENTAL & ICT HARDWARE

**Total marks: 100 (Semester end examination-60, Practical- 20, Internal assessment- 20)**

#### UNIT I

Evolution of Computer system, Classification of Computer, Modern Computer, Hardware and Software. Major components of a Digital Computer (A brief introduction of CPU, Main memory, Secondary memory devices and I/O devices) Keyboard, monitor, mouse, printers, Secondary storage devices (floppy disks, hard disks and optical disks), backup system and why it is needed? Bootstrapping a Computer.

Number System: Representation of numbers (only a brief introduction to be given) and characters in computer. Binary, Hexadecimal, Octal, BCD, ASCII, EDCDIC and Gray codes. Conversion of bases. Representation of signed integers, Sign and magnitude,  $1^s$  complement and  $2^s$  complement representation. Arithmetic operations using  $2^s$  complement representation and conditions for overflow/underflow and its detection.

Assembler, Compiler, Interpreter, Linker and Loader. Definition and concepts of algorithm and its different implementations-pseudo code, flowchart and Computer programs.

#### UNIT II

Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, defragmentation, scanning for virus, formatting, installing additional HDD. New trends in HDD. Floppy Disk Drive.

#### UNIT III

Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-r, CD-RW, DVDROM, DVD technology, preventive maintenance for DVD and CD drives, New Technologies. Driver installation, Writing and cleaning CD and DVD.

#### UNIT IV

Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of mother boards. RAM, different kinds of RAM. RAM up gradation. Cache and Virtual Memory concept.

#### UNIT V

SMPS. BIOS. Network Interface Card, network cabling, I/O Box, Switches, RJ45 connectors, Patch panel, Patch cord, racks, IP address.

### **SUGGESTED READINGS:**

1. Anita Goel, *Computer Fundamentals*, Pearson, 2010.
2. *Comdex: Hardware and Networking Course Kit*, DreamTechpress.
3. V. Rajaraman, Neeharika Adabala, *Fundamentals of Computers*, PHI, 6th Edition.
4. Ron Gilster, *PC Hardware: A Beginner's Guide*, Tata McGraw Hill.
5. E. Balaguruswamy, *Computer Fundamentals and C Programming*, Tata McGraw Hill.

## **LABORATORY**

### **Practical Assignments covering paper BCA. C1. (Computer Fundamentals & ICT Hardware)- 40 marks (At least 6 assignments have to be done by each student from the following list.)**

**Objectives:** The Practical introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like Windows OS, LINUX OS, and device drivers. Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, using wildcards. In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Different ways of hooking the PC on to the network and internet from home and work place and effectively usage of the internet. Configuring the TCP/IP setting. Usage of web browsers, email, news groups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

### **List of Experiments/Tasks:**

**Task1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva.

**Task3:** Every student should individually install MS Windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Task5:** Basic commands in Linux

**Task6:** Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Task7:** Software Trouble shooting: Students have to be given a mal functioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

**Task8:** The test consists of various systems with Hardware/Software related troubles, formatted disks without operating systems. Installation of antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active downloads to avoid viruses and/or worms.

## BCA.C2.INTRODUCTION TO C PROGRAMMING

Total marks: 100(Semesterendexamination-60, Practical-20 Internal Assessment-20)

### UNIT I

#### Overview of C

Importance of C, sample C program, C program structure, executing C program. Variables, Data Types, Constants: integer constant, real constant, character constant, string constant; Character set, C tokens, keywords and identifiers, variables declaration, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile.

#### Operators and Expression

Categories of operator-Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bit wise and special operators; arithmetic expressions, precedence and associativity of operators, type conversions, mathematical functions

#### Managing Input and Output Operators

Reading and writing a character, formatted input, formatted output.

### UNIT II

#### Decision Making and Branching Statement

*If* statement,*if.....else*statement,*nestedif....else*statement,*switch....case*statement,*goto* statement.

#### Decision Making and Looping

Definition of loop, categories of loops, *for* loop *while* loop, *do-while* loop, *break* statement, *Continue* statement

### UNIT III

#### Arrays

Declaration and accessing of one &two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays..

#### Functions

The form of C functions, Return values and types, return statement, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes.

### Unit IV

#### Structures and Unions

Defining, giving values to members, initialization and comparison of structure variables, array of structure, array within structure, structure within structure, structures and functions, unions.

#### Preprocessors

Macro substitution, file inclusion.

## Unit V

### Pointers

Definition of pointer, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.

### File Management in C

Opening, closing and I/O operations on files, random access to files, comm. And line arguments.

### SUGGESTED READINGS:

1. Byron Gottfried, *Schaum's Outline Programming with C*, Second Edition, Tata McGraw-Hill
2. Yashavant Kanetkar, *Let Us C*, Eighth Edition, BPB Publications.
3. Kernighan and Ritchie, *The C Programming Language*, Second Edition, Prentice Hall,

## LABORATORY

**Practical Assignments covering paper BCA.C2 (Introduction to C programming)-60 marks (At least 20 programming assignments have to be done by each student from the following list. The assignments should be selected in such a way that all the features of C language are included.) List of Experiments:**

1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied Driver is married. • Driver is an unmarried, male and above 30 years of age. • Driver is unmarried, female and above 25 years of age. • Write a program to decide if a driver is to be insured using logical operators.
6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also the irrespective counts.
7. Write a program to read values of n and x and print the value of y using switch case where
  - a.  $y=n+x$  when  $n=1$
  - b.  $y=1+x/n$  when  $n=2$
  - c.  $y=n+3x$  when  $n=3$
  - d.  $y=1+nx$  when  $n>3$  or  $n<1$ .
8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows: a. If  $\text{sales} \leq \text{Rs.}500$ , commission is 5%. b. If  $\text{sales} > 500$  but  $\leq 2000$ , commission is Rs 35 plus 10% above Rs 500. c. If  $\text{sales} > 2000$  but

$\leq 5000$ , commission is Rs185 plus 12% above Rs.2000. If sales  $> 5000$ , commission is 12.5%.

9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.

10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.

11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.

12. Write a program to print the digits of a number in words.

(eg. if a number 841 is entered through the keyboard your program should print "Eight Four One".)

13. Write a program to print the PASCAL Triangle upto then-throw where n is an input to the program.

14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.

15. Write a program to convert a decimal number in to binary number using function.

16. Write a program to display the result of sine series using function.

17. Write a program to find the sum of the following series  $1+x-x^3/3!+x^5/5!-x^7/7!+\dots$  corrected up to the 3 decimal place.

18. Write a program to read n numbers in a sorted array and insert a given element in a particular position

19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.

20. Write a program to print the values of nCr and  $nCr \geq pr$  for given positive integers  $n > 0$ . Use a function fact(n) to return the factorial of a non-negative integer.  $nCr = n! / r! * (n-r)!$   $nPr = n! / (n-r)!$

21. Write a program to display the first n Fibonacci numbers using function.

22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.

23. Write a program to Multiply two matrices using function

24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.

25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.

26. Write a program to read a mXn matrix and calculate the Row sum and Column Sum of the matrix

27. Write a function to read in an integer and print the representation of the number using the sign and magnitude e representation scheme using 8 bits. The program should check for overflow/underflow conditions. The left most bit is to be used as the sign bit.

28. Write a program to merge two sorted arrays.

29. Write a program to implement selections or t using function.

30. Write a program to count the number of vowels in a string.

31. Write a program to concatenate two strings using function (without using library function).

32. Write a program to convert a string from upper case to lower case and vice versa.
33. Write a program to swap two numbers using function (pass the pointers).
34. Write a program to sort number of strings in ascending order using pointer.
35. Write a program using pointers to copy a string to another string variable (without using library function).
36. Declare a structure of a student with details like roll number, student name and total marks. Using this, declare an array with 50 elements. Write a program to read details of n students and print the list of students who have scored 75 marks and above.
37. Create a structure to store the following information of employees. An Employee's number, name, pay and date of joining.  
It has been decided to increase the pay as per the following rules: Pay $\leq$ Rs.3000:20% increase Pay $\leq$ Rs.6000but $>$ Rs.3000:15% increase Pay $>$ Rs.6000:no increase Write a program to implement the above structure.
38. Write a program to read a text file and count the number of vowels in the text file.
39. Write a program to copy a text file to another file.

## GE-1: Computer Fundamentals

Theory: 60 lectures

- |  |            |
|--|------------|
| <b>1. Introduction:</b> Introduction to computer system, uses, types.  | <b>6L</b>  |
| <b>2. Data Representation:</b> Number systems and character representation, binary Arithmetic.   | <b>12L</b> |
| <b>3. Human Computer Interface:</b> Types of software, Operating system as user interface, utility programs  | <b>6L</b>  |
| <b>4. Devices:</b> Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, webcam, monitor, printer, plotter  | <b>10L</b> |
| <b>5. Memory:</b> Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks  | <b>6L</b>  |
| <b>6. Computer Organisation and Architecture:</b> C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors. | <b>12L</b> |
| <b>7. Overview of Emerging Technologies:</b> Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.   | <b>8L</b>  |

### Reference Books:

1. A.Goel,ComputerFundamentals,PearsonEducation,2010.
2. P. Aksoy,L.DeNardis,IntroductiontoInformationTechnology,CengageLearning,2006
3. P. K.Sinha,P.Sinha,FundamentalsofComputers,BPB Publishers,2007

### Computer Fundamentals Lab Practical: 60 lectures

Practical exercises based on MSOffice/Open Office tools using document preparation and spreadsheet handling packages.

#### MSWord

1. Prepare a **grocery list** having four columns (Serial number, The name of the product, quantity and price)for the month of April,06.
  - Font specifications for Title (Grocery List):14-pointArial font in bold and italics.
  - Theheadingsofthecolumnsshouldbein12-pointandbold.
  - The rest of the document should be in10-pointTimesNewRoman.
  - Leaveagapof12-pointsafterthetitle.
2. Create a **telephone directory**.
  - Theheadingshouldbe16-pointArialFontinbold
  - There s to f the document should use10-pointfontsize
  - Otherheadingshoulduse10-pointCourierNewFont.
  - The footer should show the page number as well as the date last updated.
3. Design a **time-table form** for your college.
  - The first line should mention the name of the college in16-point Arial Font and should be bold.
  - The second line should give the course name/teacher'snameandthedepartmentin14-pointArial.
  - Leaveagapof12-points.
  - There s to f the document should use10-point TimesNewRoman font.
  - The footer should contain your specifications as the designer and date of creation.

4. BPB Publications plan to release a new book designed as per your syllabus. Design the **First page of the book** as per the given specifications.
- The title of the book should appear bold using 20-point Arial font.
  - Then a name of the author and his qualifications should be in the center of the page in 16-point Arial font.
  - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
  - The details of the offices of the publisher (only location) should appear in the footer.
5. Create the following one page documents.
- a. Compose a note inviting friends to a get-together party at your house, including a list of things to bring with them.
  - b. Design a certificate in landscape orientation with a border around the document.
  - c. Design a Garage Sale sign.
  - d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
- (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
  - (b) Use a news letter format to promote upcoming projects or events in your classroom or college.
7. Convert following text to a table, using comma as delimiter  
Type the following as shown (do not bold).

**Color, Style, Item**  
**Blue, A980, Van**  
**Red, X023, Car**  
**Green, YL724,**  
**Truck Name, Age, Sex**  
**Bob, 23, M**  
**Linda, 46, F**  
**Tom, 29, M**

## GE-I: (b) System Administration and Maintenance

02 Lectures, 04 Practical, Credits 4(2+2)

Theory: 20 Lectures Practical: 20 Lectures

### UNIT 1 :( Linux/Unix)

(8Lectures)

Basics of operating system, services,

- Installation and configuration, maintenance
- What is Linux/Unix Operating systems, Kernel, API, cli, gui,
- Difference between Linux/Unix and other operating systems
- Features and Architecture
- Linux features, advantages, disadvantages

### UNIT 2: (Windows)

(12Lectures)

- Windows as operating system, history, versions.
- PC hardware, BIOS, Devices and drivers,
- Kernel Configuration and building
- Application installation, configuration and maintenance
- Server services and Client services
- Difference between Windows XP/windows7andwindowsserver2003/2008

### Practical/Lab work to be performed

#### A. Software Lab Based on System Administration and Maintenance Linux:

Linux Desktop tour, Configuring desktop environment and desktop settings
--

<b>Basic Commands:</b> Terminal, shell, Cat, ls, cd, date, cal, man, echo, pwd, Mkdir, rm, rmdir, Ps, kill
--

<b>Package Installation</b>
-----------------------------

Synaptic package manager
--------------------------

## B. Windows:

<p>Creating users–Admin and regular.</p> <p>Path of their personal files. Adding and changing passwords.</p> <p>Difference between work group and domain. Concept of roles.</p> <p>User profiles–creating and roaming Concept of Active Directory. Creating active directory in windows 2003/2008.</p>
<p>Process and Disk management</p> <p>Windows Task manager. File systems–NTFS, FAT.</p>
<p><b>Services</b></p> <p>Control Panel</p> <p>C:/program Files, C:/system C:/windows</p> <p>Add/remove new hardware (like printer), Add/remove new programmes.</p>
<p><b>Network Administration</b></p> <p>Ipconfig, Ping, tracert, route, hostname, net, netstat, whoami</p> <p>Set manual IPaddress, check connectivity– ipv4,ipv6</p>
<p><b>Administrator Tools</b></p> <p>Control Panel-&gt;Administrative Tools</p> <p>Computer Management, Local security Policy, Performance Monitor, Task Scheduler, Anti virus and firewall.</p>
<p><b>Misc</b></p> <p>Start-&gt;Accessories-&gt;System tools -&gt; All options (Remote desktop, backup/restore etc.)</p> <p><b>LAN</b>–sharing printer, files and folder over the network.</p>

**Bridge Course**  
**Total Marks: 100**

**Unit 1:** Set Theory, Relations and Functions (15 Marks)  
Sets and Functions (Sets Relations and Functions, Trigonometric Functions)

**Unit 2:** Matrices and Determinant (15 Marks)  
Definition of a Matrix; Matrices: Various Types of Matrices; Operations on Matrices; Symmetric and Skew-Symmetric Matrices; Row Operations, Column Operations; Inverse of a Matrix by Elementary Row Operations.  
Determinants: Concept of Determinant; Minors and Co-factors in Determinants; Expansion of a Determinant; Properties of Determinants.

**Unit 3:** [Algebra](#) (20 Marks)  
(Principle of Mathematical Induction, Complex Numbers and Quadratic Equations, Linear Inequalities, Permutations and Combinations Binomial Theorem, Sequence and Series)

**Unit 4:** [Calculus](#) (Limits and Derivatives) (20 Marks)  
Basic Formulae of Differentiation; Differentiation from the First Principle; Derivative of the Product of Functions, Quotient of two functions, Function of a function (Chain Rule).  
Integral Calculus  
Indefinite Integral: Basic Formulae and Standard results of Integration; Integration by Substitution; Integration using Trigonometric Identities; Integration by Parts  
Derivatives of Exponential functions, Logarithmic functions, Inverse Trigonometric functions; Differentiation by Trigonometrical Transformations; Differentiation of Implicit functions; Differentiation using Logarithms.

**Unit 5:** [Probability](#) and Statistics (20 Marks)  
(Measures of Dispersion: Range, Mean deviation, variance and standard deviation of ungrouped/grouped data, Conditional probability, multiplication theorem on probability, independent events, total probability, Bayes' theorem)

**Unit 6:** Trigonometry (10 Marks)  
Generation of angles, useful terminology, quadrant, Measurement of angles: different systems, Definition of  $\pi$ , Relation between three systems, Trigonometrical Ration and function

**Reference Books:**

1. Chand's Mathematics books for classes XI and XII

**DETAILED SYLLABUS  
SEMESTER-II  
BCA.C3. MATHEMATICS-I**

**Total marks: 100(Semester end examination-80, Internal assessment- 20)**

**UNIT I**

**Marks: 30**

**Determinants and Matrices**

Definition and different types (such as identity matrix, diagonal matrix etc) of matrices, vectors and matrices. Addition, subtraction and multiplication of matrices. Properties of matrix operations. Existence of additive and multiplicative identity and additive inverse matrices. Transpose of a matrix and its properties. Symmetric and skew symmetric matrices. Elementary transformation of a matrix. Invertible matrices.

Determinant of a square matrix, minor, cofactor. Adjoint of a matrix and matrix inversion. Determination of rank of a matrix. Eigen values and Eigen vectors of a matrix (Stressing on symmetric matrices). Cayley-Hamilton theorem-Cramer's rule. Consistency of a system of linear non-homogenous equations and existence of solutions (statement only). Simple problems. Solutions of simultaneous linear equations by Gaussian elimination method.

**UNIT II**

**Marks: 20**

**Complex Numbers**

Definition and Algebra of complex numbers. Modulus and conjugate of a complex number. Representation of complex numbers-Argg and diagram and polar representation. Roots of linear and quadratic equations in one variable, real roots, irrational roots, complex roots, Relation between the roots and the coefficients.

**UNIT III**

**Marks:20**

**Limits and Derivatives**

Intuitive idea of limits and derivatives. Limits of polynomials and rational functions. Derivatives, Algebra of derivative of a function. Derivative of polynomials and trigonometric functions.

**UNIT IV**

**Marks: 10**

**Calculus**

Roll's theorem, Lagrange's Mean Value theorem and Taylor's theorem. Meaning of the sign of derivative. Indeterminate forms, maxima and minima (single variable).

**SUGGESTED READINGS:**

1. Narayanan S. and Manickavachagam, *Allied Mathematics Vol. 1 & Vol. 2.*
2. M.K. Venkataraman, NPC, *Engineering Mathematics Vol. 1 & Vol. 2,*

## BCA.C4.DATASTRUCTURE ANDALGORITHM

**Total marks: 100(Semesterendexamination-60, Practical-20, Internal assessment-20)**

### UNIT I

#### **Definition:**

Concept of Data Types, elementary structure, words and their interpretations, packed words

#### **Arrays:**

Types, memory representation, address translation functions for one & two dimensional arrays, different examples.

### UNIT II

#### **Linked Structure:**

Singly and doubly linked list, circular and noncircular, list manipulation with pointers, example involving insertion and deletion of elements and their comparative studies with implementations using array structure

#### **Stacks and Queues**

Definitions, representation using array and linked list structure, application of stack and queues in simulation, postfix conversion and evolution of arithmetic expressions

### UNIT III

#### **Binary Trees:**

Definition, quantitative properties, memory representation, Trees traversal algorithms (recursive and non-recursive), threaded trees, BFS, DFS

### UNIT IV

#### **Searching**

Linear and binary search algorithms, performance and complexity, binary search trees (construction, insertion, deletion and search), Concept of optimal binary search trees.

### UNIT V

#### **Sorting:**

Terminology, performance evaluation, sorting algorithms (non recursive, recursive description, Complexity, advantages and disadvantage, implementation)

Bubble sort, insertion sort, selection sort, Tree sort, heap sort, quick sort, merge sort & radix sort. External Sorting.

### UNITVI

#### **Analysis of Algorithm**

Time and Space complexity of algorithms, average case and worst case analysis, asymptotic notation as a measure of algorithm complexity, O and notations. Analysis of sorting algorithms-Selection sort, Bubble sort, Insertion sort, Heap sort, Quick sort and analysis of searching algorithms– linear search and binary search.

### **SUGGESTED READINGS:**

1. *Data Structure*, Horowitz and Sahani, Narosa
2. *Introduction to Data Structures in C*, A.N. Kamthane, Pearson, 2007.
3. *Data Structure using C and C++*, Langsam, Augenstein & Tanenbaum, PHI
4. *Data Structures in C*, A.S. Nair, T. Mahalekshmi, PHI, EEE.
5. *Data Structures using C*, S.K. Bandyopadhyay, K.N. Dey, Pearson.

## **LABORATORY**

**Practical assignments covering paper BCA.C4. (Data Structure and Algorithm)-50 marks (Each student should do at least 15 assignments from the following list.)**

### **List of Experiments: (Write programs in C language)**

1. Implement binary search and linear search algorithms on arrays.
2. Implement following sorting algorithms:
  - i) Bubble sorting
  - ii) Insertion sort
  - iii) Heap sort
  - iv) Quick sort
  - v) Merge sort
3. Write a program to create a singly linked list and insert an element at the beginning, end, and at a given position of the linked list.
4. Write a program to create a singly linked list and delete an element from any position of the linked list.
5. Write a program to create a singly linked list. Write functions for i) counting the number of elements in a list. ii) to search for a given element in a list. If the item has been found then it should return the position at which the item was found; otherwise it should return -1 to indicate not found.
6. Write a function to concatenate two linked lists.
7. Write a function to merge two sorted linked lists.
8. Write a program to create a doubly linked list and insert an element at any position.
9. Write a program to create a doubly linked list and delete an element from a given position.
10. Write a program to create a circular linked list and insert/delete an element at any position.

11. Write a program to implement a stack using i)array structure ii)linked list structure
12. Write a program to implement two stacks using a single array.
13. Write a program to evaluate a postfix expression using stack.
14. Write a program to convert an infix expression into a postfix expression.
15. Write a program to implement a queue using array.
16. Write a program to implement a queue using linked list.
  
17. Write a program to implement a circular queue using array.
18. Write a program to implement a circular queue using linked list.
19. Write a program to create a binary search tree using link representation and display the elements in preorder, in\_order and post\_order using recursive function.
20. Write a program to create a binary search tree using link representation and i)search ii)delete an item from the binary search tree.

## **GE2: (a) Introduction to Programming**

### **Theory: 60 lectures**

#### **1. Introduction to C and C++**

**(5Lectures)**

History of C and C++, Overview of Procedural Programming and Object-Oriented Programming, Using main() function, Compiling and Executing Simple Programs in C++.

#### **2. Data Types, Variables, Constants, Operators and Basic I/O**

**(10Lectures)** Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc).

#### **3. Expressions, Conditional Statements and Iterative Statements**

**(10Lectures)**

Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operator Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

#### **4. Functions and Arrays**

**(10Lectures)**

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays/Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

#### **5. Derived Data Types (Structures and Unions)**

**(5Lectures)** Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

#### **6. File I/O, Preprocessor Directives**

**(8Lectures)**

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

#### **7. Using Classes in C++**

**(8Lectures)**

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as

parameters, specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

## **8. Inheritance and Polymorphism**

Introduction to Inheritance and Polymorphism

### **Reference Books:**

1. HerbtzSchildt, "C++:TheCompleteReference",FourthEdition,McGrawHill.20032.BjarneStroustrup,"TheC++ProgrammingLanguage",4thEdition,Addison-Wesley, 2013.
3. BjarneStroustrup,"Programming--PrinciplesandPracticeusingC++",2ndEdition,Addison-Wesley2014.
4. EBalaguruswamy,"ObjectOrientedProgrammingwithC++",TataMcGraw-HillEducation,2008.
5. PaulDeitel,HarveyDeitel,"C++HowtoProgram",8thEdition,PrenticeHall,2011.6.JohnR.Hubbard,"ProgrammingwithC++",Schaum'sSeries,2ndEdition,2000.

## LABORATORY

**Practical Assignments covering paper GE2 (Introduction to C programming)-60 marks (Atleast 20 programming assignments have to be done by each student from the following list. The assignments should be selected in such a way that all the features of C language are included.)List of Experiments:**

1. Write a program to convert a given temperature value from Fahrenheit scale to Centigrade scale and vice versa.
2. Write a program to display ASCII value of a character.
3. Write a program to check whether a number is perfect or not.
4. Write a program to find out the biggest of three numbers using nested if.
5. A company insures its drivers if either of the following conditions are satisfied Driver is married. • Driver is an unmarried, male and above 30 years of age. • Driver is unmarried, female and above 25 years of age. • Write a program to decide if a driver is to be insured using logical operators.
6. Write a program to read a list of positive integers terminated by -1 and display the odd and even numbers separately and also their respective counts.
7. Write a program to read values of n and x and print the value of y using switch case where
  - a.  $y=n+x$  when  $n=1$
  - b.  $y=1+x/n$  when  $n=2$
  - c.  $y=n+3x$  when  $n=3$
  - d.  $y=1+nx$  when  $n>3$  or  $n<1$ .
8. Write a program to n values of sales and then calculate the commission on sales amount where the commission is calculated as follows a. If  $\text{sales} \leq \text{Rs.}500$ , commission is 5%. b. If  $\text{sales} > 500$  but  $\leq 2000$ , commission is Rs 35 plus 10% above Rs 500. c. If  $\text{sales} > 2000$  but  $\leq 5000$ , commission is Rs 185 plus 12% above Rs. 2000. d. If  $\text{sales} > 5000$ , commission is 12.5%.
9. Write a program to find out minimum, maximum, sum and average of n numbers without using array.
10. Program to find mean and standard deviation (SD) for a set of n numbers without using array.
11. Write a program to find out the roots of a quadratic equation. Use proper testing to find checks for real and complex roots.
12. Write a program to print the digits of a number in words. (eg. if a number 841 is entered through the keyboard your program should print "Eight Four One".)
13. Write a program to print the PASCAL Triangle upto then-throw where n is an input to the program.
14. Write a function to return the HCF of two positive integers. Write a main function to read two positive integers and print their HCF and LCM by using the above function.
15. Write a program to convert a decimal number into binary number using function.
16. Write a program to display the result of sine series using function.

17. Write a program to find the sum of the following series  $1+x-x^3/3!+x^5/5!-x^7/7!+\dots$  corrected upto the 3 decimal place.
18. Write a program to read numbers in a sorted array and insert a given element in a particular position
19. Write functions to compute the factorial of a number using both recursive and non-recursive procedure.
20. Write a program to print the values of  $nCr$  and  $nPr$  for given positive integers  $n > 0$ . Use a function  $fact(n)$  to return the factorial of a non-negative integer  $n$   $nCr = n! / r! * (n-r)!$   $nPr = n! / (n-r)!$
21. Write a program to display the first  $n$  Fibonacci numbers using function.
22. Write a program to display the prime numbers within a given range. Write a function to check whether a given integer is prime or not and use it.
23. Write a program to Multiply two matrices using function
24. Write a program to display the upper Triangle and lower Triangle of a given square matrix using function.
25. Write a function to check if a given square matrix is symmetric or not. Write a main function to implement it.
26. Write a program to read a  $m \times n$  matrix and calculate the Row sum and Column Sum of the matrix
27. Write a function to read in an integer and print the representation of the number using the sign and magnitude representation scheme using 8 bits. The program should check for overflow/underflow conditions. The left most bit is to be used as the sign bit.
28. Write a program to merge two sorted arrays.

## **GE II: (b) Programming in Python**

02Lectures, 04Practical, Credits 4(2+2)  
Theory: 20Lectures      Practical: 20Lectures

### **UNIT 1: Planning the Computer Program (2Lectures)**

Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation

### **UNIT2: Techniques of Problem Solving**

**(2Lectures)F**

Flow charting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming

### **UNIT3: Overview of Programming**

**(4Lectures)**

Structure of a Python Program, Elements of Python

### **UNIT4: Introduction to Python**

**(4Lectures)**

Python Interpreter, Using Python as calculator, Python shell, Indentation, Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bitwise operator, Increment or Decrement operator).

### **UNIT5: Creating Python Programs**

**(4Lectures)**

Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, Default arguments.

### **UNIT6: Python File Operations**

**(4Lectures)**

Understanding read functions, read(), read line() and read lines(), Understanding write functions, write() and write lines(), Programming using file Operations, Reading config files in python, writing log files in python.

## Practical/Lab work to be performed

### Section: A(Simple programs)

(N.B: Student has to perform **any four** of the following experiments)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:  
Grade A: Percentage  $\geq 80$   
Grade B: Percentage  $\geq 70$  and  $< 80$   
Grade C: Percentage  $\geq 60$  and  $< 70$   
Grade D: Percentage  $\geq 40$  and  $< 60$   
Grade E: Percentage  $< 40$
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Write a program to display the first n terms of Fibonacci series.
5. Write a program to find factorial of the given number.
6. Write a program to find sum of the following series for n terms:  
 $1 - \frac{2}{2!} + \frac{3}{3!} - \dots - \frac{n}{n!}$
7. Write a program to calculate the sum and product of two compatible matrices.

### Section: B(Visual Python)

(N.B: Student has to perform **any four** of the following experiments)

*All the programs should be written using user defined functions, wherever possible.*

1. Write a menu-driven program to create mathematical 3D objects  
(i) curv, (ii) sphere, (iii) cone, (iv) arrow, (v) ring, (vi) cylinder.
2. Write a program to read n integers and display them as a histogram.
3. Write a program to display sine, cosine, polynomial and exponential curves.
4. Write a program to plot a graph of people with pulse rate vs. height. The values of p and h are to be entered by the user.
5. Write a program to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula  $m = \frac{60}{t+2}$ , where t is the time in hours. Sketch a graph of t vs. m, where  $t \geq 0$ .
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:  
$$P(t) = \frac{15000(1+t)}{15+e}$$
Where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
  - (i) Velocity wrt time ( $v = u + at$ )
  - (ii) Distance wrt time ( $s = u*t + 0.5*a*t*t$ )
  - (iii) Distance wrt velocity ( $s = \frac{v^2 - u^2}{2*a}$ )
8. Write a program to show a ball bouncing between 2 walls. (Optional)

## REFERENCEBOOKS

1. T. Budd, Exploring Python, TMH, 1st Ed,2011
2. Head-First Python: A Brain-Friendly Guide (2nd Edition), *Paul Barry*.
3. Python: The Complete Reference
4. Python Tutorial/Documentation [www.python.org](http://www.python.org)2015
5. Allen Downey,Jeffrey Elkner,Chris Meyers, How to think like a computer scientist: learning with Python, Freelyavailableonline.2012
6. <http://docs.python.org/3/tutorial/index.html>
7. <http://interactivepython.org/courselib/static/pythonds>

# DETAILED SYLLABUS

## SEMESTER-III

### **BCA.C5.COMPUTER BASED ACCOUNTING AND FINANCIAL MANAGEMENT**

**Total marks: 100(Semester end examination-60, Practical-20, Internal assessment-20)**

#### **Part: I Accounting**

- Introduction-Definition,function,objective,need,advantage,events and transaction,double entry system of book keeping.
- Books of accounts-classification of books of accounts, meaning of journal, our nalizing of transactions, ledger and ledger posting, closing of books of accounts and preparation of trial balance.
- Cashbook-single column,double column and triple column; depreciation.
- Financial statements-Trading, Profit and Loss Account and Balance Sheet.

#### **Part: II Tally**

1. Introduction–Versions of Tally,Features of Tally, ERP Features,Data Directory, and Tally switching between screen areas.
2. Company creation:-Create/Alter/Select/Close/Delete.

Introduction onF11 features&F12configuration.

3. Basic Accounting: - Accounting Info Ledger/Group (Single & Multiple) Create/Display/Alter/Delete.
4. Accounting Voucher:-Types of Voucher, Configuring Voucher, Voucher Creation, Entering/Altering & Deleting.
5. Basic of Tally Inventory:-“IntegratedA/c with Inventory”Create/Display/Alter/(Single&Multiple):Group,Category,Godown,Units(Simple/Compound)
6. Invoicing:-Purchase &Sales in Invoice format, Debit Credit notes/Discount/Description
7. Inventory Voucher

#### **Part: III**

##### **Advanced Accounting**

1. Bill wise Details–Transaction wise Bill By Bill for trading & non trading organization
2. Interest Calculation–Simple & Advance parameters Interest calculation on outstanding Balances, use of vouchers class, Adjustment entries
3. BRS-Simple & Advanced
4. Multiple Currencies–Create of different currencies, voucher entries, Adjustment entries on forex gain/loss
5. Cost Center & Cost Categories–(By using purchase, Sales, Receipt, Payment voucher) Create/Alter/ Display.
6. AdvanceInventory-Actual/DifferentBilledQty,O,, Value,Batchwise,AlternateUnits,BOM,

## Price List

7. Budget & Control—Create/Alter, Budget for group/ ledger /cost Center.
8. Scenario Mgt—Create/Alter/Delete. Transactions

## Printing, Housekeeping & Administration

9. Administration—Security control, Tally Audit.
10. Housekeeping—Group company, Split company Export Data, ODBC.
11. Printing—Company printing option, Setting to a Bill.

## SUGGESTED READINGS:

1. K.R. Das, K.M. Sinha, K.S. Paul  
Choudhury, G.G. Banik; *Accountancy (for H.S. first year)*; LBS Publication.
2. B.B. Dam; *Accountancy (for H.S. first year)*.
3. A.K. Nadhani, K.K. Nadhani; *Implementing Tally-9*; BPB Publication, Delhi.
4. N. Agarwal and S. Agarwal; *Comdex Tally- 9 Course Kit (with CD)*.
5. A.K. Nandhani; *Tally-9, Training Guide*, BPB Publication.

## Covering paper-C5 (Computer Bases Accounting and Financial Management)—50 Marks (Each student should do atleast 10 assignments from the following list.)

### List of Experiments:

1. Create Multiple Ledger of the following Account Heads: Bank Charges; Basic Pay; Bonus; Bonus Paid; Business Promotion Expenses; Commission Paid; Conveyance; Depreciation on Air Conditioner; Depreciation on Building; Depreciation on Computers; Depreciation on Furniture & Fixtures; Depreciation on Motor Car; Depreciation on Plant & Machinery; Discount; Donation; Electricity Charges; Employers Contribution to Provident Fund; Freight Outward; Insurance Premium; Interest Due; Interest & Finance Charge; Interest on Bank Overdraft; Interest on Partner's Capital A/c; Interest on Unsecured Loans; Legal Fees; Miscellaneous Expenses; Office Rent; Office Repairs & Maintenance; Printing & Stationery; Rent; Rent Due; Travelling Expenses.
2. Make necessary entries in Tally in the books of Galaxy Enterprise: (a) Introduced Cash Rs 10,00,000, Furniture worth Rs 1,00,000, Computer worth Rs 86,000, Machinery Rs 1,20,000 into the business on 1st Jan, 2010 (b) Opened a Current A/c with Bank of Baroda with Rs 1,00,000 on 2nd Jan, 2010 (c) Purchased goods on 6th Jan, 2010 from Sridhar Stores on credit Rs 2,25,000 (d) Sold goods for Cash Rs 1,20,000 to Maitree Stores on 7th Jan, 2010 (e) Sold goods to Sankar on credit for Rs 34,000 on 9th Jan, 2010 (f) Paid Rent

advance Rs25,000 by Cheque No345671 on 10th Jan, 2010 (g) Withdrew from bank Rs5,000 for office expenses on 18th Jan, 2010 (h) Purchased stationery items on 22nd Jan, 2010 for office use from Radhika Stationeries for Rs1,500 (i) Received Advance from Jagat for supply of goods worth Rs12,000 (j) Paid salary to office staff Rs10,000 by Cheque 345672 on 31st Jan, 2010

3. Make Data Entries for the following transactions: (a) Withdrew Rs1,00,000 cash from SBI on 6th Jan, 2011 (b) Deposited Rs40,000 in HDFC Bank on 9th Jan, 2011 (c) Transferred Rs20,000 from HDFC Bank to SBI on 12th Jan, 2011 (d) Paid Rs4,300 as Insurance charges through HDFC Bank on 18th Jan, 2011 (e) Received Rs 3,25,000 from ABC Co. Ltd. On 23rd Jan, 2011 against our sales through Cheque and it has been deposited in SBI (f) Sales worth Rs5,50,000 made on credit to Vikas Group on 29<sup>th</sup> Jan, 2011 (g) Provision towards Employers PF Contribution Rs78,000 made on 31<sup>st</sup> Jan, 2011 (h) Purchased Machinery Rs1,00,000 from Sunder Enterprise (INPUT VAT 12.5%)

4. Enter the following transactions in Tally in the books of Computer Solutions: (a) Purchased on 8th April, 2009 HCL Celeron 15 Nos @ Rs14,000; HCL PIV 15 Nos @ Rs 21,000 from Next Generation Systems (Input VAT @ 4%) (b) Sold on 10th April, 2009 to Fortune Computer Services 10 Nos HP Laserjet Series 1010 @ Rs12,000 (Output VAT @ 12.5%) (c) Received from Fortune Computer Services Rs80,000 on 25<sup>th</sup> April, 2009 (d) Paid to Next Generation System Rs2,00,000 vide Cheque No357602 of HDFC Bank

5. Record the following transactions in Tally in the books of Hind Computers: (a) Returned one Wireless Keyboard Rs250 to Super Buzz (Input VAT 4%) on 13th August, 2010 (b) Returned from Computer Junction BMPIV Rs500 on 16<sup>th</sup> August, 2010 (CST 4%) (c) Transferred 10 Nos CDROM Disks (1 Box @ Rs265/Box) from Stores to Defective Goods Stores on 31st August, 2010

6. Prepare a Cash Book from the books of ABC Enterprise: (a) Cash Balance on 1<sup>st</sup> April 2010 Rs4,00,000 (b) Opened a Current Account with UCO Bank on 5<sup>th</sup> April, 2010 with Rs16,000 (c) Purchased goods for Cash Rs2,50,000 on 6<sup>th</sup> April, 2010 (d) Sold goods for Cash Rs1,25,000 on 8<sup>th</sup> April, 2010 (e) Paid for Travelling Expenses Rs2,300 on 10<sup>th</sup> April, 2010 (f) Paid for Staff Welfare Rs1,200 on 16<sup>th</sup> April, 2010 (g) Introduced Additional Capital Rs50,000 on 20<sup>th</sup> April, 2010 (h) Withdrew from Bank for Office Cash Rs2,000 on 27<sup>th</sup> April, 2010 (i) Sold goods for Rs65,000 on 28<sup>th</sup> April, 2010 and payment received by Cheque 15,000 and balance in Cash

7. Prepare a Double Column Cash Book from the following transactions of XY Ltd: (a) On 1<sup>st</sup> Jan, 2010 Cash in Hand Rs5,00,000 and Cash at SBI Rs2,30,000 (b) On 4th Jan, 2010 Goods purchased for cash Rs1,24,000 (c) On 8th Jan, 2010 Goods sold for cash Rs2,25,000 (d) Deposited into SBI an amount of Rs1,10,500 (e) Paid rent to landlord Rs24,000 by Cheque no234675 (f) Withdrew from SBI Rs30,000 for purchase of Furniture (g) Received payment of Rs 30,000 from Amit Kothari, a customer by Cheque (h) Withdrew from SBI Rs23,000 for office cash

8. Make relevant Voucher Entries from the following transactions:(a)On 1st April, 2010 India Infotech received a Bill (vide No. 001) from Phoenix Agencies for Rs. 5,00,000 towards the Advertisement services rendered. (b) On April 8, 2010, payment of Rs. 4,95,000 is made towards bill no. Bill-001 to Phoenix Agencies for the purchase of Advertisement services, vide cheque no. 254781 (c) On May 6, 2010, Universal Infotech, paid TDS of Rs. 5,000 towards Advertisement Expenses, vide cheque no. 056330 for the month of April, 2010.

9. Show how would you deal with the following Bills in Tally: (a) On 7th May, 2010, India Infotech received a bill (vide no. 911) from Gautam Bishnu & Associates for Rs. 1,12,360 inclusive of other charges of Rs. 12,360 towards the auditing services provided (TDS Rs. 10,000) (b) On 8th May, 2010 India Infotech received a bill (vide No. 696) from Digitech Computers for Rs. 25,000 towards commission charges. (c) On 12th May, 2010 India Infotech received a bill (vide No. 874) from Digitech Computers for Rs. 40,000 towards commission charges. (d) On 14th May, 2010 India Infotech deducted tax Rs. 2,500 towards Commission Expenses for the transaction dated 8th May and Rs. 4,000 towards transaction dated 12th May.

10. Prepare a Bank Reconciliation Statement of Digitech Solutions on 31st December, 2010  
(a) Balance as per Bank Book on 31st Dec, 2010 Rs. 32,000 (b) Cheque deposited into UBI Rs. 13,000 on 27th Dec, 2010 cleared by bank on 31st Dec, 2010 omitted to be recorded in Cash Book (c) Withdrew from UBI Rs. 2,000 for office cash on 28th Dec, 2010 but omitted to be recorded in Cash Book (d) Service Charge debited by UBI Rs. 200 not credited in Cash Book (e) Bank Interest Rs. 568 credited by UBI not recorded in Cash Book (f) Dividend from UTI Rs. 12,450 credited by UBI not recorded in Bank Book (g) Direct deposit by Ravi, a customer Rs. 3,400 into our UBI A/c not recorded in Cash Book

11. Choose the Correct Answer: (i) What kind of procedure is used while operating the key F1? (a) ALT and F1 (b) CTRL and F1 (c) SHIFT and F1 (d) F1 (ii) By default how many Groups and Ledgers does Tally have? (a) 22 Groups and 2 Ledgers (b) 28 Groups and 3 Ledgers (c) 28 Groups and 2 Ledgers (d) 26 Groups and 3 Ledgers (iii) To toggle back to the, Main Area, the short cut key is (a) CTRL and M (b) CTRL and A (c) CTRL and I (d) CTRL and N (iv) Ledger Menu comes under (a) Accounts Info (b) Inventory Info (c) Accounting Vouchers (d) Inventory Vouchers (v) To change the current period press (a) F1 (b) ALT and F1 (c) F2 (d) ALT and F2

12. Fill in the Blanks: (a) To display the, Change Voucher Type "press ----- (b) The short cut key to view detailed "Profit & Loss A/c" is ----- (c) To record the Voucher in "Sales" press ----- (d) To shut an Activated Company press ----- (e) The short cut key used to get the, Stock Journal Voucher "screen is -----

13. Show relevant Voucher Entry in Tally: (a) You have purchased an item at a rate of Rs. 100 on 8th April, 2010 however by mistake your supplier had billed you at a rate of Rs. 95. Now your supplier issues a debit note for balance of Rs. 5 plus vat and other applicable duty Rs. 6. (b) You have agreed to pay a purchase invoice of Rs. 1,00,000 within 1 month time to

Your supplier Geeta Stores. However, you couldn't manage to pay and your supplier agreed for a delayed payment at an interest rate of @2.p.m. for the same.

14. The total gross salary payable by XLtd for the month of January 2010 is Rs. 3,00,000. Out of above, basic salary which is eligible for Provident Fund contribution @12% is Rs. 2,00,000. XLtd also requires to pay a sum @12% from the basic salary before the same is disbursed to employee. Apart of this, it is also required to pay @1.61% (of basic pay additional amount as per below: @1.10% towards PF administration fees; @0.50% towards Employees Deposit linked insurance scheme and @0.1% towards EDLI administration charges. Show how you would record the above transactions in Tally.

15. BX Ltd purchased a machinery for Rs 5,00,000. To use this machine company requires a platform, pipe connections, electrical connections, fabrication works etc. at the cost

of Rs. 1,00,000. On the expense of Rs. 1,00,000 tax to be deducted at source. The Company made a contract with Arun Contractors for electrical and fabrication work. On 10-8-2010 BX Ltd received bill for Rs. 60,000 from Arun contractors towards electrical and fabrication work. Record the above transaction in Tally.

### **BCA.C6.DIGITAL LOGIC FUNDAMENTALS**

**Total marks: 100 (Semester end examination- 80, Internal assessment-20)**

#### **UNIT-I**

##### **Boolean Algebra and Logic Gates**

Axiomatic definition of Boolean algebra, Rules (postulates and basic theorems) of Boolean algebra, dual and complement of Boolean expression, Canonical form and Standard form, Sum of product and product of sum form, Conversion between Boolean expression and truth table, Karnaugh map method (upto four variable kmap), Don't care condition, and Quine McCluskey method, Different types of gates, Implementation of logic expression with logic gates.

#### **UNIT-II**

##### **Combinational Circuit**

Adder: half adder, full adder, Subtractors: half subtractor and full subtractor, Magnitude comparator, Decoder, Encoder, Application examples of decoder and encoder, Multiplexer, Demultiplexer, Application examples of multiplexer and Demultiplexer.

#### **UNIT-III**

##### **Sequential Circuit**

Simple RS flip-flop or latch, Clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop, Analysis of Clocked Sequential circuits, State Reduction and Assignment, Flip-Flop Excitation tables, Design Procedure for sequential circuits.

## **UNIT-IV**

### **Counters**

Ripple counters: Binary Ripple Counter, BCD Ripple Counter, and Synchronous Counters: Binary Counter, Binary Up and down Counter, BCD Counter, Counter design using state diagram, state table and state equation.

## **Unit-V**

### **Registers**

Registers: Shift registers(serialin serialout, serialin parallelout, parallelin serialout, parallelin parallelout),Registers with parallel Load,Bidirectional shift register with parallel load.

### **SUGGESTED READINGS:**

1. M.M. Mano,*Digital Logic and Computer Design*, PHI, 1994
2. C. Bartee, *Computer Architecture and Logic Design*, McGraw Hill, 1991

## BCA.C7.MATHEMATICS–II

**Total marks: 100(Semesterendexamination-80, Internal assessment-20)**

### UNIT I

#### **Sets, Relations and Functions**

Definition and representation of sets, cardinality of sets, elementary set operations- union, intersection, difference, cartesian product, concept of universal set and complementation, Venn diagram, De Morgan's Law. Simple properties of these operations. Computer representation of sets. Relations, properties of binary relations- reflexive, transitive symmetric and anti-symmetric, closures of relations, equivalence relations, equivalence classes and partitions. Partial ordering relations and lattices.

Functions, one-to-one and onto, composition of functions, invertible functions. Principle of mathematical induction.

### UNIT II

#### **Combinatorics and Recurrence Relations**

Permutations, Combinations, partitions, permutations with repetitions, combinations with repetitions, permutations of sets within distinguishable objects.

Recurrence relations and their solutions.

### UNIT III

#### **Graphs**

Basic concepts, directed and undirected graphs, paths, reachability and connectedness, cycles and trees. Bipartite, Eulerian and Hamilton graphs, computer representation of graphs- matrix and linked representation of graphs. Algorithms on graphs, Breadth first search, Depth first search.

### UNIT IV

#### **Mathematical Logic**

Logical variables and constants, connectives, truth tables, Normal forms-CNF, DNF. Converting expressions to CNF and DNF. Theory of inference, Propositional calculus.

### UNIT V

#### **Sequence and Series**

Sequence, Arithmetic Progression and Geometric Progression, general term, A.M.(Arithmetic Mean) and G.M.(Geometric Mean). Relation between A.M. and G.M. Sum of AP and GP series. Sum to n terms of special series. Sequence of real numbers, bounded, convergent and non-convergent sequences. Uniqueness of the limit and bounds of a convergent sequence. Infinite series, exponential and logarithmic series.

**SUGGESTED READINGS:**

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGraw Hill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.
3. *Discrete Mathematics*, N.Ch. SNIyengar, K.A. Venkatesh, V.M. Chandrasekaran, P.S. Arunachalam, Vikash Publishing House Pvt Ltd.

## SEC-1: Oracle (SQL/PL-SQL)

(1+2Lab)

Theory: 15Lectures

### 1. Introduction to Oracle as

#### RDBMSSQL Vs.SQL\*Plus:

SQL Commands and Data types, Operators and Expressions, Introduction to S QL\*Plus.(2L)

### 2. Managing Tables and Data:

- Creating and Altering Tables(Including constraints)
- Data Manipulation Command like Insert, update, delete
  
- SELECT statement with WHERE, GROUP BY and HAVING, ORDER BY, DISTINCT, Special operator like IN, ANY, ALL BETWEEN, EXISTS, LIKE
- Join, Built in functions (4L)

### 3. Other Database Objects

- View
- Synonyms, Index (2L)

### 4. Transaction Control Statements

- Commit, Rollback, Save point (2L)

### 5. Introduction to PL/SQL

- SQL v/s PL/SQL
- PL/SQL Block Structure
  
- Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.)
- %TYPE and %ROW TYPE
  
- Using Cursor (Implicit, Explicit) (5L)

#### Books Recommended:

1. Ivan Bayross, "SQL, PL/SQL the Programming Language of Oracle Paperback", BPB Publications, 2010.
2. Steven Feuerstein, Bill Pribyl, "Oracle PL/SQL Programming", 6th Edition, O'Reilly Media, 2014.
3. Rajeeb C. Chatterjee, "Learning Oracle SQL and PL/SQL: A Simplified Guide", PHI, 2012.
4. Ron Hardman, Michael McLaughlin, "Expert Oracle PL/SQL", Oracle Press, 2005.
5. Michael McLaughlin, "Oracle Database 11g PL/SQL Programming", Oracle Press, 2008.
6. John Watson, Roopesh Ramklass, "OCA Oracle Database 11g SQL Fundamentals I Exam Guide", Oracle Press, 2008.

**Software Lab Based on SQL/PL-SQL:  
Practical:30 Lectures**

**[SQL COMMANDS]**

- 1) SQL\*formatting commands
- 2) To create table, alter and drop table.
- 3) To perform select, update, insert and delete operation in a table.
- 4) To make use of different clauses viz where, group by, having, order by, union and intersection,
- 5) To study different constraints.

**[SQL FUNCTION]**

- 6) To use oracle function viz aggregate, numeric, conversion, string function.
- 7) To understand use and working with joins.
- 8) To make use of transaction control statement viz rollback, commit and save point.
- 9) To make views of a table.
- 10) To make indexes of a table. **[PL/SQL]**
- 11) To understand working with PL/SQL
- 12) To implement Cursor on a table.
- 13) To implement trigger on a table

**SUGGESTED READINGS:**

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGraw Hill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.
3. *Discrete Mathematics*, N.Ch. SNIyengar, K.A. Venkatesh, V.M. Chandrasekaran, P.S. Arunachalam, Vikash Publishing House Pvt Ltd.

**GE-3: (a) Computer**

**Networks and Internet Technologies Theory: 60 lectures**

- 1. Computer Networks:** Introduction to computer network, data communication, components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet. **6L**
- 2. Network Models:** Client/server network and Peer-to-peer network, OSI, TCP/IP, Layers and functionalities. **8L**
- 3. Transmission Media:** Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation, Satellite. **4L**
- 4. LAN Topologies:** Ring, bus, star, mesh and tree topologies. **2L**
- 5. Network Devices:** NIC, repeaters, hub, bridge, switch, gateway and router.

**2L6. Internet Terms:** Webpage, Homepage, website, internet browsers, URL, Hypertext, ISP, Webserver, download and upload, online and offline. **2L**

**7. Internet Applications:** www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs. **6L**

**8. Introduction to Web Design:** Introduction to hypertext markup language (html) Document type definition, creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (css) for text formatting and other manipulations. **16L**

**9. JavaScript Fundamentals:** Data types and variables, functions, methods and events, Controlling program flow, JavaScript object model, built-in objects and operators. **14L**

**Reference Books:**

1. Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition), PHI, 2010
2. B.A. Forouzan, Data Communication and Networking, TMH, 2003.
3. D.R. Brooks, An Introduction to HTML and JavaScript for Scientists and Engineers, Springer W. Willard, 2009
4. HTML A Beginner's Guide, Tata McGraw-Hill Education, 2009.
5. J.A. Ramalho, Learn Advanced HTML4.0 with DHTML, BPB Publications, 2007

**Computer Networks and Internet Technologies Lab**  
**Practical: 60 lectures**

Practical exercises based on concepts listed in theory using HTML.

1. CreateHTMLdocumentwithfollowingformatting–  
 Bold,Italics,Underline,Colors,Headings,Title,FontandFontWidth,Background,Paragraph,LineBrakes,HorizontalLine,Blinkingtextaswellasmarqueetext.
2. CreateHTMLdocumentwithOrderedandUnorderedlists,InsertingImages,InternalandExternalinking
3. Create HTML document with Table:


4. Create Form with Input Type, Select and Text Area in HTML.
5. Create an HTML containing RollNo., student’s name and Grades in a tabular form.
6. Create an HTML document(having two frames)which will appear as follows:

AboutDepart ment1 Department2 Department3	This frame would show the contents according to the link clicked by the user on the left Frame.
--	--

7. Create an HTML document containing horizontal frames as follows:

Department Names(could be along with Logos)
Contents according to the Link clicked

8. Createawebsiteof6–7pageswithdifferenteffectsasmentionedinaboveproblems.

9. Create a form using HTML which has the following types of controls:

- V. TextBox
- VI. Option/radio buttons
- VII. Checkboxes
- VIII. Reset and Submit buttons

### Subscribe to XYZ News Magazine and Emails

Interested in receiving daily small updates of all latest News? Well, now you can. And best of all, it is free! Just fill out this form and submit it by clicking the "send it In" button. We will put you on our mailing list and you will receive your first email in 3-5 days.

---

Please fill the following boxes to help us send the emails and our news letter:

First Name:

Last Name:

Business:

We must have a correct e-mail address to send you the news letter:

Email:

How did you hear about XYZ News Magazine and Emails?

Here on the Web    In a magazine    Television    Other

Would you like to be on our regular mailing list?

Yes, we love junk emails

---

#### List of Practical using Javascript:

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.8.Print the largest of three numbers.
2. Find the factorial of a number n.
3. Enter a list of positive numbers terminated by Zero. Find the sum and average of the se numbers.
4. A person deposits Rs1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
5. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

#### SUGGESTED READINGS:

1. Tremblay, J.P, Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*, 2nd print 1988, McGrawHill.
2. Kolman, Bernard, Robert C. Busby and Sharon Ross, *Discrete Mathematical Structures*, 3rd Edition, PHI.
3. *Discrete Mathematics*, N. Ch. SNIyengar, K.A. Venkatesh, V. M. Chandrasekaran, P.S. Arunachalam, Vikash Publishing House Pvt Ltd.

## **GE 3: (b) E-Commerce Technologies**

04 Lectures, 04 Practical, Credits 6(4+2)  
Theory: 60 Lectures      Practical: 60 Lectures

### **UNIT1: An introduction to Electronic commerce**

**(10 Lectures)**

What is E-Commerce (Introduction and Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business models (C2B, C2C, B2B, B2C, B2G, G2B, G2C)

### **UNIT2: The Internet and WWW**

**(10 Lectures)**

Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.), Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Banner, Exchange, Shopping Bots

### **UNIT3: Internet Security**

**(10 Lectures)**

Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime (Laws, Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus (How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorization and Authentication, Firewall, Digital Signature (How it Works))

### **UNIT4: Electronic Data Exchange**

**(10 Lectures)**

Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash

### **UNIT5: Planning for Electronic Commerce**

**(10 Lectures)**

Planning Electronic Commerce initiates, Linking objectives to business strategies, Measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce websites

### **UNIT6: Internet Marketing**

**(10 Lectures)**

The PROS and CONS of online shopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e-commerce.

## **Practical/Lab work to be performed**

(N.B: Student has to perform **any four** of the following

experiments)

**E-Commerce Technologies LAB** (based on the following

topics):

1. Hyper Text Markup Language(HTML):structural setup; page layout; text manipulation; special characters;images;links.Intermediate:imagemaps;tables;frames,forms;metatags;web forms.
2. CascadingStyleSheets(CSS):embedding/linking;HTMLelementselectors;classes;IDselectors;textmanipulation;background;bordersandspacing;layout;contextselectorsandgrouping;pseudo-classes;pseudo-elements.
3. JavaScript:writinyourfirstscript;creatingHTMLtags;userinputandoutput;loopsandtables;payrollcalculator,formsandtext fields;validatinganemailaddress;radiobuttons;checkboxes;self-gradingtests,imagerollovers;slideshows;real-timeclock;controllableclock;workingwithcookies.
4. Perl/CGI10:samplePerloperations;randomnumbers;lists;dealingfourpokerhands;time manipulation;subroutines,hashtables;files;stringmatching,CGI;registrationlists;surveys.
5. SQLandregularexpressions:Regularexpressions:select;where;orderby;insert;update;delete,like;aggregatefunctions;createtable;altertable;dropdeterministicfunctions;non-deterministicfunctions,basics;repeating;positioning.
6. Beginner:between;in;distinct;groupby;aliases;table.,nestedselects;SoundEx;join;
7. ASPstructuralsetup:responsewrite;retrievingfromforms;retrievingfromquerystring;variables;controlconstructs;subroutinesandfunctions;sessionstate;applicationvariables;servervariables;debugging,readingandwritingcookies;server-sideincludes;responseobjectmethods;VBScriptfunctions;errorhandling;debugging,browserdetails;CDONTS;files;outputfromarecordset;global.asa;setuptoolsforusingISandASP.Flash3CreateFlashmoviesofmovingand interactive objects.

## **REFERENCEBOOKS**

1. G.S.V.Murthy,E-CommerceConcepts,Models,Strategies-:- HimalayaPublishingHouse,2011.
2. KamleshKBajajandDebjaniNag,E- Commerce,2005.
3. GrayP.Schneider,Electroniccommerce,InternationalStudentEdition,2011,
4. HenryChan,RaymondLee,TharamDillon,ElizabethChang,ECommerce,Fundamentals andApplications,WielyStudentEdition,2011

## DETAILED SYLLABUS

### SEMESTER-IV

#### BCA.C8.SOFTWARE ENGINEERING

**Total marks:100(Semester end examination-80,Internal assessment-20)**

##### UNIT I

**Marks:20**

###### **Introduction:**

Software Processes & Characteristics, Software lifecycle, Models- Waterfall, Prototype, Evolutionary and Spiral Models.

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, requirements analysis using DFD, Data dictionaries, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.

##### UNIT II

**Marks: 20**

###### **Software Project Planning:**

Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Risk Management.

##### UNIT III

**Marks:20**

###### **Software Design:**

Data design, Architectural design, Interface design, Function Oriented Design, Object Oriented

Design, Cohesion & Coupling, Classification of Cohesiveness & Coupling, Software Metrics: different types of project metrics.

##### UNIT IV

**Marks: 20**

###### **Software Testing and Maintenance:**

Testing Process, Design of Test Cases, Types of Testing, Functional Testing, Structural Testing, Test Activities, Unit Testing, Integration Testing and System Testing, Debugging Activities

Software Maintenance: Management of Maintenance, Maintenance Process, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. Software quality Assurance.

CASE tools--- Analysis tools, design tools, SQA tools, software testing tools.

###### **SUGGESTED READINGS:**

1. Rajeev Mall—*Software Engineering*, PHI

2. Pressman Roger—*Software Engineering A Practitioners Approach*; Tata McGraw Hill
3. James F. Peters, Witold Pedrycz—*Software Engineering An Engineering Approach*

**BCA.C9.COMPUTER ORGANIZATION AND ARCHITECTURE**  
**Total marks: 100(Semester end examination- 80, Internalassessment-20)**

**Unit I**

**Introduction**

Functional units of a computer, basic instructions (zero, one, two, three address), bus structure, memory locations, memory addresses, memory operations, instruction and instruction sequencing (straight line sequencing and branching). Addressing modes, stack, subroutine, I/O instructions.

**Unit-II**

**Register Transfer Logic**

Introduction, inter register transfer, arithmetic micro-operation, logic micro-operation, shift micro-operation, Conditional control statements, fixed point binary data, instruction code, design of a simple computer.

**Unit-III**

**Processor Logic Design**

Processor organization, design of arithmetic and logic circuit, status register, design of accumulator.

**Unit-IV**

**Control Logic Design**

Hardware control, micro-programmed control block diagram.

**Unit-V**

**I/O Subsystem**

Program controlled I/O, Interrupts: enabling and disabling interrupts, handling interrupts from multiple sources (priority control), DMA.

**Unit-VI**

**Memory Subsystem**

Semiconductor memory, SRAM, DRAM, ROM types, Cache memory, Flash memory, mapping functions.

**SUGGESTED READINGS:**

1. M. Morris Mano, *Digital Logic and Computer Design*, PHI publication
2. Hamacher, Vranesic and Zaky, *Computer Architecture*
3. William Stallings, Pearson, *Computer Organization and Architecture 29*

**BCA.C10.DATABASEMANAGEMENTSYSTEM**  
**Totalmarks:100(Semesterendexamination-60,Practical-  
20Internalassessment-20)**

**UNIT I**

**Introduction**

Data, Database, Database management system, Characteristics of the database approach, Role of Database administrators, Role of Database Designers, EndUsers, Advantages of Using a DBMS and When not to use a DBMS.

**DBMS Architecture: Data Models–**

Categories of data models, Schemas, Instances, and Database states. DBMS Architecture and Data Independence–

The Three schema architecture, Data independence. DBMS Languages and Interfaces. Classification of Database Management Systems.

**UNIT II**

**Data Modeling Using Entity-Relationship Model**

Using High Level Conceptual Data Models for Database Design, Example Database applications. Entity types, Entity Sets, Attributes and Keys. Relationships, Relationship types, Roles and Structural constraints. Weak Entity Types and Drawing E- R Diagrams.

**Index Structures for Files:** Single Level Ordered Indexes–Primary indexes, Clustering indexes and Secondary indexes. Multi-level indexes, Hashing concepts.

**UNIT III**

**Relational Data Model**

Relation, Integrity constraints- domain, entity and Referential integrity constraints, Basic Relational Algebra operations, select, project and join operations.

**Database Design**

Functional dependencies and Normalization for Relational Databases- Normalization concepts, first, second, third normal forms, Boyce-Codd normal form. Functional dependency diagram and design of relational database from it

**UNIT IV SQL**

SQL data definition and data types, specifying constraints in SQL, schema change statements, SQL

constructs (Select... From... Where... Groupby... Having... Orderby... Exists... NotExists), Insert, Delete, Update, View, Definition and use, nested queries, Constraints considers (NOT NULL, UNIQUE, Check, Primary key, Foreign key, Default) Introduction to PL/SQL (basic concept). 30

## UNITV

### Transaction Processing Concepts and Concurrency Control Techniques

Transaction and System concepts – Desirable properties of Transactions – Schedules and Recoverability. Lock-Based Protocols – Locks, Granting of Locks, and Two phase locking protocol and implementation of locking

### Data Base Administration

Introduction to Database security issues, Discretionary Access Control Based on Granting/Revoking of Privileges and Multi-level security, Database recovery concepts.

### SUGGESTED READING:

1. *Introduction to database management system*, C.J.Date, Pearson Education
2. *Fundamentals of database management system*, Elmasri & Navathe, Pearson Education
3. *An introduction to Database systems*; Bipin C. Desai; Galgotia publications.
4. *Database Systems-Concept, Design and Applications*; S.K. Singh; Pearson Education.

## LABORATORY

### Covering Paper 3.3(Database Management System)-

50 Marks Each student should do at least 6 assignments from the following list.

#### List of Experiments:

1. Create a table Employee with the following columns: Emp\_no(numeric) primary key  
Emp\_name(string) Join\_  
date(Date)  
Basic\_pay\_fixed\_at(numeric) Dat  
e\_of\_birth(Date)

Insert the following data into the table.

Emp_no.	Emp_name	Join_date	Basic_pay	Date_of_birth
1001	Charles Babbage	01-Jun-2000	8000.00	03-10-1973
1002	George Boole	01-Jul-2001	5000.00	04-12-1972
1003	E.F.Codd	01-Jun-2001	8000.00	06-03-1969
1004	Bill Gates	01-Jul-2003	5000.00	09-10-1995
1005	Tony Greig	01-Aug-2004	8000.00	04-05-1985

2. Create the following two tables and insert data into the tables. Player  
(Rollno. → Primary Key)

Rollno.	Name
10	Vijay Amrithraj
20	Leander Paes
30	Mahesh Bhupathi
40	Sania Mirza

Match (Match\_no → Primary key, Rollno → Foreign key) M

Match_no	Roll_no.	Match_Date	Opponent
1	20	10-Jul-2008	Washington2
		Jan-2008	30 12-Sampras3
	20	12-Aug-2008	Borg
4	30	20-Mar-2008	Vijay

Perform the following two operations:

- (i) Perform EQUIJOIN operation to retrieve data from both the files.
- (ii) Perform OUTERJOIN operation to retrieve the unmatched records.

3. Design an ER diagram for a BANK database schema. To consider that each Bank can have multiple branches and each branch can have multiple Accounts and Loans for customer. Also to specify the non weak & weak entity types, key attributes & key types, relationship types, instances, constraints and participations.

4. Create a table Student taking the attributes given below

Roll\_no, Student\_name, Address, Date\_of\_admission, Class Section and Contact\_no.

Write appropriate queries to perform the following operations:

- (i) To insert values in the Student table.
- (ii) To delete values from Student table
- (iii) To list the names of all students which roll\_no > 20.
- (iv) To search for students who got admitted before 01-01-2006.
- (v) To change the name of the student whose roll number is 10 to Amar.

5. Create tables Department and Employee with the attributes given below. Employee (EmpNo, Empname, Address, Dno)  
Department (Dno, Dname, Location) Dno

in Employee is a foreign key.

Write appropriate queries to perform the following operations:

- (i) To insert values in the tables.
- (ii) To retrieve the names and addresses of all Employees working in the Finance department.
- (iii) To print the location where Administration department is located.
- (iv) to delete all information regarding a particular employee.

6. Create table Student and Course taking the attributes given below. Student (Roll\_no, Name, Semester, Course\_no (Foreignkey)) Course (Course\_no, Course\_name)

Write appropriate queries for the following operations:

- (i) To retrieve names of all students who are admitted to the course "BCA".
- (ii) To retrieve the names of all students whose course name is "BCA" and who are in the 3<sup>rd</sup> semester.
- (iii) To display details of all courses in which more than 100 students got admitted.
- (iv) For course being offered, display the course name and number of students admitted to the course.

7. Create tables Employee, Department, Location, Works\_on, and Project taking the attributes given below.

Employee (Fname, Lname, Empno, Bdate, Address, Salary, Dnumber) Department (Dname, Dnumber, Mgrno) Locations (Dnumber, DLocation) Works\_on (Empno, Pnumber, Hours\_per\_day) Project (Pname, Pnumber, Location, Dnumber (Foreign)) Dependent (Empno, Dependent\_name, Sex, DOB, Relationship)

Write appropriate queries for the following operations:

- a) Retrieve the names and addresses of all employees who work in the Finance department.
- b) To retrieve the names of all employees who work on all the projects controlled by department number 6.
- c) For each department, print the name of the department and the name of the manager of the department.
- d) Retrieve the location where the Administration department is located.
- e) For every project located in Mumbai list the project number, the controlling department and department manager's name and address.
- f) Find out how many employees are there in each department.
- g) Find the total salary of all employees of the "Research" department, as well as the maximum, minimum and average salary in this department.
- h) Retrieve the name of all employees who have no dependent.
- i) Alter the "Employee" table by deleting the column B date.
- j) Retrieve the Fname, Lname of all employees whose salary is higher than average salary.
- k) For each department retrieve the department number, the number of employees in the department and their average salary.

- l) Retrieve the name of all employees who have two or more dependent
- m) Retrieve the details of all employees who work on project number 1,2,3

#### 8. Create Table

Client\_master(Client\_no,name,address,Bdue) Product\_master(P\_number,Description,saleprice,costprice) Sales\_master(Salesmno,Sname,Address,Salamnt,Remarks) Sales\_order(O\_no,Client\_no,Odate,Delyaddr,Salesmno) Sales\_order\_detail(Order\_no,Product\_no,Qty\_order,product\_rate,Qty\_dispatched)

Write appropriate queries to perform the following operations:

- i) List name of all clients having, a "a" as the second letter in their names.
- ii) Retrieve the description and total Qty sold for each product.
- iii) Find product no. and description of non moving products(i.e product not being sold).
- iv) For each product being sold, list the product number and the total amount(in Rs.) sold.
- v) List all client who stay in "Bangalore" or "Mumbai"
- vi) List the clients who stay in a city whose First letter is "M"
- vii) Find the names of clients who had purchased the item, "Trouser".
- viii) Find out if "T-Shirt" has been ordered by any client and if so print the details of the client.
- ix) List details of all products whose unit price is more than Rs.5000.00.
- x) Calculate the total amount (in Rs.) purchased by each client that has purchased items amounting more than Rs.20000.

#### 9. Create table

Author(Author\_id,Name,City,Country)

Catalog(Book\_id,Title,Author1\_id,Author2\_id,Publisher\_id,Category\_id,Year,Price) Publisher(Publisher\_id,Name,City,Country)

Order\_details(Order\_no,Book\_id,Quantity) Category(Category\_id,Description)

Order\_summary(Order\_no,Member\_id,Odate,Amount,Ostatus) Member(Member\_id,Name,Address,Contact)

Assume that all books have at most two authors.

Write appropriate queries to perform the following operations:

- a) Retrieve the title, author, and publisher names of all books published in 1999 and 2006.
- b) Retrieve the title of all books whose one author is "A Tanenbaum".
- c) Get the details of all books whose price is greater than the average price of the books.
- d) Get the names of all the books for which an order has been placed.
- e) Get the names of all authors who have more than ten books in the catalog.
- f) Get the details of the authors whose books are being sold from the book club.
- g) Get the title and price of all books whose price is greater than the maximum of the category average.

## SEC-2:Linux/Unix Programming Syllabus

### Theory: 15Lectures

(1+2Labs)

#### 1.Introduction

(5L)

- What is linux/unix Operating systems
- Difference between linux/unix and other operating systems
- Features and Architecture
- Various Distributions available in the market
- Installation, Booting and shutdown process
- System processes (an overview)
- External and internal commands
- Creation of partitions in OS
- Processes and its creation phases—Fork, Exec, wait



#### 1. User Management and the File System

(5L)

- Types of Users, Creating users, Granting rights
- User management commands
- File quota and various file systems available
- File System Management and Layout, File permissions
- Login process, Managing Disk Quotas
- Links (hardlinks, symbolic links)

#### 2. Shell introduction and Shell Scripting

(6L)

- What is shell and various type of shell, Various editors present in linux
- Different modes of operation in vi editor
- What is shell script, Writing and executing the shell script
- Shell variable (user defined and system variables)
- System calls, Using system calls
- Pipes and Filters

- Decision making in Shell Scripts(If else,switch),Loops in shell
- Functions
- Utility programs(cut,paste,join,tr, un utilities)
- Pattern matching utility(grep)

**Reference Books:**

1. Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2006
2. Michael Jang RHCSA/RHCE Red Hat Linux Certification: Exams (Ex200 & Ex300) (Certification Press), 2011
3. Nemeth Synder & Hein, Linux Administration Handbook, Pearson Education, 2nd Edition, 2010
4. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The socket s Networking API, Vol. 1, 3rd Edition, 2014

**Software Lab Based on  
Linux: Practical: 30 Lectures**

1. Write a shell script to check if the number entered at the command line is prime or not.
2. Write a shell script to modify—call command to display calendar of the specified months.
3. Write a shell script to modify—call command to display calendar of the specified range of months.
4. Write a shell script to accept a login name. If not a valid login name display message—  
—Entered login name is invalid.
5. Write a shell script to display date in the mm/dd/yy format.
6. Write a shell script to display on the screen sorted out put of—`who` command along with the Total number of users.
7. Write a shell script to display the multiplication table any number,
8. Write a shell script to compare two files and if found unequal ask the user to delete the duplicate file.
9. Write a shell script to find the sum of digits of a given number.
10. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
11. Write a shell script to find the LCD (least common divisor) of two numbers.

12. Write a shell script to perform the tasks of basic calculator.
13. Write a shell script to find the power of a given number.
14. Write a shell script to find the binomial coefficient  $C(n,x)$ .
15. Write a shell script to find the permutation  $P(n,x)$ .
16. Write a shell script to find the greatest number among the three numbers.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.

### **GE-4: Multimedia and Applications Theory: 60 lectures**

1. **Multimedia:** Introduction to multimedia, components, uses of multimedia, 6L  
Multimedia applications, virtual reality.
2. **Text:** Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, 4L  
Hyper media & Hypertext.
3. **Images:** Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural 6L  
light & colors, computerized colors, color palettes, image file formats.
4. **Sound:** Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats. 6L
5. **Video:** How video works, analog video, digital video, video file formats, video 8L  
Shooting and editing.
6. **Animation:** Principle of animations, animation techniques, animation file formats. 10L
7. **Internet and Multimedia:** www and HTML, multimedia on the web – web servers, 6L  
Web browsers, web page makers and site builders.
8. **Making Multimedia:** Stages of a multimedia project, Requirements to make good 14L  
multimedia, Multimedia Hardware -  
Macintosh and Windows production Platforms, Hardware peripherals -  
Connections, Memory and storage devices, Multimedia software and Authoring tools.

#### **References:**

1. Tay Vaughan, —Multimedia: Making it work!, TMH, Eighth edition. 2011
2. Ralf Steinmetz and Klara Naharstedt, —Multimedia: Computing, Communications Applications!, Pearson. 2012
3. Keyes, —Multimedia Handbook!, TMH, 2000.
4. K. Andleigh and K. Thakkar, —Multimedia System Design!, PHI. 2013

## Multimedia and Applications Lab

### Practical: 60 lectures

Practical exercises based on concepts listed in theory using  
Flash/GIMP/PhotoShop/AnimationTools/ImageEditors/VideoEditors.

#### Optional

Implement the followings using Flash-

1. Create an animation using the tools panel and the properties panel to draw the following—  
Line, pe, oval, circle, rectangle, square, pencil ,brush, lasso tool
2. Create an animation using text tool to set the font, size ,color etc.
3. Create an animation using **Free transform tool** that should use followings-  
Move Objects

Skew Obj  
ects Stretc  
h Objects  
Rotate Ob  
jects

Stretch Objects while maintaining proportion R  
otate Objects after relocating the center dot

4. Create an animation using layers having following features-  
Insert layer, Delete layer, guide layer, Mask layer.
5. Modify the document (changing background color etc.) using the following tools

Eraser  
Tool Hand  
tool Ik  
bottle tool  
Zoom  
tool

Paint Bucket  
tool Eye  
dropper tool

6. Create an animation for a bus race in which both start from the same point and a car wins the race.
7. Create an animation in which the text "Hello" gets converted into "Good Bye" (using motion/shape tweening).
8. Create an animation having five images having a fade-in/fade-out effect.
9. Create a scene to show the sunrise (using multiple layers and motion tweening)
10. Create an animation to show the ripple effect.
11. Create an animation (using Shape tweening and shape hints) for transforming one shape into another.
12. Create an animation for a bouncing ball (you may use a motion guide layer).

# DETAILED SYLLABUS

## SEMESTER-V

### BCA.C11.OBJECTORIENTEDPROGRAMMINGUSINGC++

**Total marks: 100 (Semester end examination-80, Practical-20 Internal assessment-20)**

#### UNIT I

**Marks:15**

##### **Introduction to object oriented programming.**

Origins of C++-Basic Concepts of Object Oriented Programming-Benefits of OOP-Applications of OOP.

##### **Introduction to c++**

Structure of a Simple C++ program-Output operator-Input operator-Cascading of I/O operators. Tokens-keyword, identifiers, constants, strings and operators. Basic data types-User defined data types-Dynamic initialization of variables-Reference variables-Operators in C++-Scope resolution operator-applications-Member dereferencing operators-Memory Management operators-new and delete.

**Control Structures**-simple if, ifelse, nestedif, switch, while do, break and continue statements. Introduction to Functions-Function Prototyping-Call by reference-Return by reference-Inline functions-Default arguments-Const arguments.

#### UNIT II

**Marks:15**

##### **Classes and objects**

Introduction-Defining a class-Class Vs structures-Creating objects-Accessing class members-Defining member functions-Outside the class definition-Inside the class definition-Outside functions as inline-Nesting of member functions-Private member functions-Memory allocation for objects-Array-Declaring an array-accessing elements of an array-Array of objects.Friendly functions.

##### **Constructors and destructors**

Basic Concepts of constructors-Default constructor-Parameterized constructor-Multiple constructors in a class-Constructor with default arguments-Dynamic initialization of objects-Copy constructor-Dynamic constructors-Destructors.

#### UNIT III

**Marks:15**

##### **Function and operator overloading**

Overloading Concepts Function Overloading: Functions with different sets of parameters, default and constant parameters. Rules for overloading operators-Defining operator overloading-Overloading Unary operators-Prefix and Postfix operator overloading-Overloading Binary operators-Overloading relational operators-Overloading using friend

functions-Overloading subscript operator.Pitfalls of operator overloading,Type conversion-  
Basic to Class-Class to Basic

**UNITIV**

**Marks:15**

**Inheritance**

Introduction-Defining derived classes-Types of inheritances-Single-Making a private member inheritable-Multilevel inheritance-Multiple inheritance-Hierarchical inheritance-Hybrid inheritance-Virtualbase classes-Abstract classes-Constructors in derived classes-Nesting of classes. 32

**Virtual functions and runtime polymorphism**-Introduction-Compile time and Runtime polymorphism-Pointers to objects-this pointer-Pointer to derived classes-Virtual functions-Rules for virtual functions-Pure virtual functions.

**UNIT V Marks:10**

### **Streams**

C++stream classes-put()andget()functions-getline()andwrite()functions-Overloading<<and>>operators-FormattedConsoleI/Ooperations-iosclassfunctions-width(),precision(),fill(),setf()andunsetf()-Formatting flags-Manipulators-Userdefinedmanipulators.

### **UNIT VI**

**Marks:10**

#### **Files**

Introduction-Stream classes for files-Opening files using constructor-Opening files using open()-File modes-Detecting end of file-eof()-Sequential input and output-put() and get()-Reading and writing objects-read() and write()-Random Access files-Manipulating file.

#### **SUGGESTED READINGS:**

1. Schildt Herbert, *The Complete Reference C++*, Tata McGraw Hill, 4th Edition, 2003.
2. Deitel & Deitel, *C++ How to program*, Pearson Education Asia, 6th Edition, 2008.
3. Bjarne Stroustrup, *The C++ Programming Language*, Special Edition, Pearson Education, 2004.
4. M.T.Somashekara, D.S.Guru, *Object-Oriented Programming with C++*, 2nd Edition, PHI, 2012.

**Practical Assignments covering paper C11 (OOP in C++)-50 marks Each student should do at least 12 practical assignments from the following-**

#### **List of Experiments:**

1. Define a class named *triangle* to represent a triangle using the lengths of the three sides. Write a constructor to initialize objects of this class, given the lengths of the sides. Also write member functions to check

- (a) if a triangle is isosceles
- (b) if a triangle is equilateral

Write a main function to test your functions.

2. Define a structure *employee* with the following specifications.

```
no: integer
ename: 20 characters
basic, hra, da: float
calculate(): a function to compute net pay as basic+hra+da with float return type
```

```
getdata(): a function to read values for empno, ename, basic, hra, da.
```

```
dispdata()
```

```
: a function to display all the data on the screen Write a main program to test the program.
```

3. Define a class circle to represent circles. Add a data member radius to store the radius of a circle. Write member functions area() and perimeter() to compute the area and perimeter of a circle.

4. Define a class complex with two data members real and imag to represent real and imaginary parts of a complex number.

Write member functions

rpart() :to return the real part of a complex number I

part():to return the imaginary part of a complex number

add():to add two complex numbers.

mul():to multiply two complex numbers. Write constructors with zero,one and two arguments to initialize objects.(This is an example of polymorphism.)

5. Define a class point with two data members x ordinate and y ordinate to represent all points in the two dimensional plane by storing their x co-ordinate and y co-ordinate values. Write member functions

dist() :to return the distance of the point from the origin.

slope():to return the slope of the line obtained by joining this point with the origin. Write constructors with zero,one and two arguments to initialize objects. Also write a friend function to compute the distance between two points.

6. Define a class string with the following data members

char\*p;

Int size;

And write member functions to do the following(without using library function)and using dynamic memory allocation.

- Length of the string
- Compare two strings
- Copy one string to another
- Reverse the string

Write suitable constructors and destructors. Also write a copy constructor for the class.

7. For the class complex defined in 4 above, overload the  $\diamond$ , + and \* operators in the usual sense. Also overload the unary- operator.

8. For the class string defined in 6 above, overload the  $\diamond$  and + operators where + is to be used for concatenating two strings.

9. Define a class time to store time a shour, minute and second, all being integer values. Write member functions to display time in standard formats. Also overload the ++ and -- operators to increase and decrease a given time by one second where the minute and hour values will have to be updated whenever necessary.

10. Define a class to store matrices. Write suitable friend functions to add and multiply two matrices.

11. Write a class based program implementing static members.

12. Define a class student with the following

specification:rollno : integer

sname:20characters

Derive two classes artst and scst. The class artst will represent students belonging to arts stream and the class scst will represent students belonging to science stream. The artst class will have additional data members ph, hs, en and as to store marks obtained by a student in three subjects Philosophy, History, English and Assamese. The class scst will have additional data members ph, ch, ma and en to store marks obtained in Physics, Chemistry, Mathematics and English.

Write the following member functions in the classes artst and scst

ctotal() : a function to calculate the total marks obtained by a student

takedata(): function to accept values of the data members

showdata(): function to display the marks sheet of a student.

13. Define an abstract base class printer. Derive three classes laser-printer, line-printer and inkjet-printer. The derived classes will have data members to store the features of that particular printer. Write pure virtual function display() in the base class and redefine it in the derived classes.

14. Define an abstract base class figure and add to it pure virtual functions

display(): to display a figure

get() : to input parameters of the

figurearea() : to compute the area of a

figure

perimeter(): to compute the perimeter of a figure.

Derive three classes circle, rectangle and triangle from it. A circle is to be represented by its radius, rectangle by its length and breadth and triangle by the lengths of its sides. Write a main function and write necessary statements to achieve runtime polymorphism.

15. Write an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function my\_sqrt() should raise an exception.

16. Define a class rational to store rational numbers as a pair of integers, representing the numerator and denominator. Write a member function for setting the values of the numerator and denominator. This function should raise an exception if attempt is made to set a zero value as the denominator and in such cases it should be set to 1.

17. Write a class template for storing an array of elements. Overload the <<and>> operators. Write a member function to sort the array in descending order.

18. Write a class template for representing a singly linked list. Write functions for inserting, deleting, searching and for displaying a linked list. Write a main function to test it on a linked list of integers and characters.

## BCA.C12.OPERATING SYSTEM

**Total marks: 100(Semester end examination-60, Practical-20Internalassessment-**

### **20)Introduction**

BasicsofOperatingSystems:Definition–

GenerationsofOperatingsystems,TypesofOperatingSystems(definitiononly):Mainframe,Batch, Multiprocessor,Distributed,Multitasking,Realtime,ParallelandTimesharing.

### **Processes**

Process: Concept of a Process, Process States, Process creation, Process termination, Context switching, Thread: Concept of thread, Design issues of thread, Types of threads, Benefits of threads Basic Concept of multi threading.

### **Process Synchronization**

Basic concept of Inter-Process communication, Race condition,Critical-Section,Mutualexclusion,semaphore,mutex.Differentwaystoachievemutualexclusion-Disabling interrupt, Test-and-Set-Lock, Peterson's solution using semaphore. Brief discussion on classical IPC problem(example-Dinning philosopher problem).

### **Scheduling**

Basic Concepts of scheduling, Scheduling objectives, preemptive and non preemptive scheduling, Scheduling criteria–CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time, Basic concepts on batch, interactive and real-time scheduling algorithm, Scheduling algorithms-FCFS,SJF,RR,priorityscheduling,Goalsofschedulingalgorithms

### **Deadlocks**

Definition, Deadlock characteristics, Methods for Handling Deadlocks, Deadlock Prevention ,Deadlock detection and Recovery, Deadlock Avoidance using Banker’s Algorithm.

### **Memory management**

Memory allocation in Multiprogramming, Relocation and Protection, Swapping, Virtual memory:-Basics of Virtual Memory, Logical versus Physical address space, Paging and Concept of Segmentation, Page fault, Page table and its entries, Dem and paging,TLB, Page replacement algorithms:- LRU, Optimal, NRU,FIFO, Second chance, Clock, NFU,Working set.

### **File system**

File concepts, File naming, File types(directory, regular, device),File attributes, Operations on file, Access Methods–Sequential, Random access, Directory in UNIX, Hierarchical directory structure, Relative path and Absolute path, Operation on directories, Disk layout, Disk partition, File system layout, Disk block allocation-Contiguous allocation, Linked list allocation, FAT, i-nodes, Filesystemsecurity36

### **I/O management**

Basic principles and overall structure of I/O management subsystem, Device controllers, Layers of the I/O subsystem-interrupt handler’s device driver,device independent I/O software and users pace I/O software.

**SUGGESTED READING:**

1. Tannenbaum, *Operating Systems*, PHI, 4th Edition, 2000
2. Silberschatz and Galvin, *Operating System Concepts*, Person, 5th Ed. 2001
3. William Stallings, *Operating System*, Prentice Hall of India, 4th Edition,

**LABORATORY**

**Practical Assignments Covering paper C12(Operating System)- 20 marks Each student should do atleast 12 assignments from the following list.**

**List of Experiments:**

1. Write a program to create child process that starts looping and then terminates.
2. Write a program to show that the child can be setup to ignore a signal from its parent.
3. Write a program to show that a process can ignore a signal.
4. Write a program to create a thread in which prints "We are proud to be Indians" and terminates.
5. Write a program to demonstrate how to "wait" for thread completions by using the Pthread join routine. Threads are explicitly created in a joinable state.
6. Write a program to create a thread in which print "We are proud to be Indians" and pass multiple arguments using structure during its creation.
7. Write a program to compute the dot product of two vectors and also show the use of mutex variable.
8. Write a program to create threads, the main thread creates three threads. Two of the threads increment a counter variable while third thread watches the value of the counter variable. When the counter variable reaches a predefined limit, the waiting thread is signaled by one of the incrementing threads. The waiting thread "awakens" and then modifies the counter. The program continues until the incrementing threads reach a final value and also print the final value.
9. Write a program to show attaching and detaching shared memory.
10. Write a program to show the communication between two processes through shared memory.
11. Write a program to show how two processes can talk to each other using wait() and signal() operations applied on semaphore.
12. Write a program in which parent process accepts a list of integers to be sorted. Parent process uses the fork system call to create a new process called a child process. Both the processes use shared memory for the list of integers. Now use the parent process to sort the integers using bubble sort and the child process to sort the integers using selection sort. Use semaphore variable for process synchronization.
13. Write a program to implement Banker's Algorithm for multiple resource type each.
14. Write a program to simulate Dining Philosophers Algorithm.

# DSE-1: Digital Image Processing

## Theory:60Lectures

### 1. Introduction

(6Lectures)

Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization.

### 2. Spatial Domain Filtering

(7Lectures)

Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, Smoothing filters,sharpening filters,gradient and Laplacian.

### 3. Filtering in the Frequency domain

(8Lectures)

Hotelling Transform, Fourier Transforms and properties, FFT(DecimationinFrequencyandDecimationinTimeTechniques),Convolution,Correlation, 2-Dsampling,Discrete Cosine Transform, Frequency domain filtering.

### 4. Image Restoration

(8Lectures)

Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position in variant degradations, Estimation of Degradation functions, Restoration from projections.

### 5. Image Compression

(10Lectures)

Encoder-Decoder model,Types of redundancies,Lossy and Loss less compression, Entropy of an information source,Shannon's1stTheorem,Huffman Coding, Arithmetic Coding, Golomb Coding,LZWcoding,Transform Coding,Sub-image size selection, block in gartifacts, DCT implementation using FFT, Run length coding,FAXcompression(CCITTGroup-3andGroup-4),Symbol-basedcoding,JBIG-2,Bit-planeencoding,Bit-allocation,ZonalCoding,ThresholdCoding,JPEG,Losslesspredictivecoding,Lossypredictivecoding,MotionCompensation

### 6. Wavelet based Image Compression

(5Lectures)

Expansionoffunctions,Multi-resolutionanalysis,Scalingfunctions,MRArefinementequation,Waveletseriesexpansion,DiscreteWavelet Transform(DWT),ContinuousWaveletTransform,FastWaveletTransform,2-DwaveletTransform,JPEG-2000encoding,DigitalImageWatermarking.

### 7. Morphological Image Processing

(7Lectures)

Basics,SE,Erosion,Dilation,Opening,Closing,Hit-or-

MissTransform, BoundaryDetection, Holefilling, Connectedcomponents, convexhull, thinning, thickening, skeletons, pruning, GeodesicDilation, Erosion, Reconstructionbydilationanderosion.

## **8. Image Segmentation**

**(9Lectures)**

Boundarydetectionbasedtechniques, Point, linedetection, Edgedetection, Edgeling, localprocessing, regional processing, Houghtransform, Thresholding, Iterativethresholding, Otsu's

method, Moving averages, Multivariablethresholding, Region-basedsegmentation, Watershedalgorithm, Useofmotioninsegmentation

### **Reference Books**

1. RCGonzalez, REWoods, DigitalImageProcessing, 3rdEdition, PearsonEducation. 2008.
2. AKJain, FundamentalsofDigital imageProcessing, PrenticeHallofIndia. 1989.
3. KRCastleman, Digital ImageProcessing, PearsonEducation. 1996
4. Schalkoff, Digital ImageProcessingandComputerVision, JohnWileyandSons. 1989.
5. RafaelC. Gonzalez, RichardE. Woods, StevenEddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

### **Digital Image Processing Lab**

#### **Practical: 60Lectures**

1. Write program to read and display digital image using MATLAB or SCILAB or Python
  - a. Become familiar with SCILAB/MATLAB Basic commands/Python
  - b. Read and display image in SCILAB/MATLAB/ Python
  - c. Resize given image
  - d. Convert given color image into gray-scale image
  - e. Convert given color/gray-scale image into black &white image
  - f. Draw image profile
  - g. Separate color image in three RG &B planes
  - h. Create color image using R,G and B three separate planes
  - i. Flow control and LOOP in Python
  - j. Write given 2-D data in image file
2. To write and execute image processing programs using point processing method

- a. Obtain Negative image
  - b. Obtain Flip image
  - c. Thres holding
  - d. Contrast stretching
3. To write and execute programs for image arithmetic operations
- a. Addition of two images
  - b. Subtract one image from other image
  - c. Calculate mean value of image
  - d. Different Brightness by changing mean value
4. To write and execute programs for image logical operations
- a. AND operation between two images
  - b. OR operation between two images
  - c. Calculate intersection of two images
  - d. Water Marking using EX-OR operation
  - e. NOT operation(Negative image)
5. To write a program for histogram calculation and equalization using
- a. Standard MATLAB function/Python function
  - b. Program without using standard MATLAB functions/ Python Function.
  - c. C Program
6. To write and execute program for geometric transformation of image
- a. Translation
  - b. Scaling
  - c. Rotation
  - d. Shrinking
  - e. Zooming

7. To understand various image noise models and to write programs for
  - a. Image restoration
  - b. Remove Salt and Pepper Noise
  - c. Minimize Gaussian noise
  - d. Median filter and Weiner filter
8. Write and execute programs to remove noise using spatial filters
  - a. Understand 1-D and 2-D convolution process
  - b. Use 3x3 Mask for low pass filter and high pass filter
9. Write and execute programs for image frequency domain filtering
  - a. Apply FFT on given image
  - b. Perform low pass and high pass filtering in frequency domain
  - c. Apply IFFT to reconstruct image
10. Write a program in C and MATLAB/Python for edge detection using different edge detection mask
11. Write and execute program for image morphological operations erosion and dilation.
12. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.

## DSE-2: Numerical Methods

### Theory:60Lectures

1. Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations
2. Bisection method, Secant method, Regula-Falsi method, Newton-Raphson method, Newton's method for solving nonlinear systems Gauss elimination method (with row pivoting) and Gauss-Jordan method, Gauss Thomas method for tridiagonal systems
3. Iterative methods: Jacobi and Gauss-Seidel iterative methods Interpolation: Lagrange's form and Newton's form
4. Finite difference operators, Gregory Newton forward and backward differences Interpolation Piecewise polynomial interpolation: Linear interpolation, Cubic spline interpolation (only method), Numerical differentiation: First derivatives and second order derivatives, Richardson extrapolation
5. Numerical integration: Trapezoid rule, Simpson's rule (only method), Newton-Cotes open formulas
6. Extrapolation methods: Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler's method Modified Euler's methods: Heun method and Mid-point method, Runge-Kutta second methods: Heun method without iteration, Mid-point method and Ralston's method Classical 4<sup>th</sup> order Runge-Kutta method, Finite difference method for linear ODE

### REFERENCE BOOKS:

[1] Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)

[2] M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)

[3] Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e (2010)

[4] Numerical Python: Scientific Computing and Data Science Applications with Numpy, SciPy and Matplotlib, Robert Johansson.

### Numerical Methods Lab

#### Practical: 60 lectures

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula-Falsi method.
3. Find the roots of the equation by Newton's method.

4. Find the solution of a system of nonlinear equation using Newton's method.
5. Find the solution of tridiagonal system using Gauss Thomas method.
6. Find the solution of system of equations using Jacobi/Gauss-Seidel method.
7. Find the cubic spline interpolating function.
8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.

# DETAILED SYLLABUS

## SEMESTER-VI

### BCA.C13.WEB TECHNOLOGY

**Total marks: 100 (Semester end examination-60, Practical-20, Internal assessment-20) UNIT I**

**Marks: 8**

#### **Overview of the World Wide Web and the internet**

A brief history of TCP/IP and the Internet, Internet services - email, telnet, ftp, Internet components, the birth of web, webpage, homepage, website, types of Internet connection - dialup, DSL, Broadband and, VSAT, WiFi

#### **UNIT II**

**Marks: 7**

#### **Web Servers and Browsers**

Web browsers -

Netscape Navigator and IE, Web browser helper applications, Web servers, Web server architecture

#### **UNIT III**

**Marks: 7**

#### **Internet Architecture**

IP addresses and its working, domain name system, URL

#### **UNIT IV**

**Marks: 8**

#### **Inside the firewall**

Firewall, proxy server, overview of intranet security, web server security, user name/password authentication. COM, DCOM, CORBA

#### **UNIT V**

**Marks: 12**

#### **Linking database to the Web**

JDBC, ODBC - CGI, ASP and PHP, Dynamic page creation and advantages

#### **UNIT VI**

**Marks: 13**

#### **HTML editors and tools**

Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML, image maps, style sheets in HTML. DHTML, XML - Introduction, Need for XML, Advantages, simple XML programs, DTD

**UNITVII****Marks:15****JavaScript**

Client side Scripting languages, history of JavaScript, Java vs. JavaScript, Creating interactive documents using JavaScript

**UNITVIII****Marks:10****Using VisualBasic Script**

ThebenefitsofVBScript,Interacting VBScript with HTML forms,VBScript variables and operators,VBScriptflow of control statements, Server Side scripting languages Introduction 38

## **SUGGESTED READINGS:**

1. I. Bayross, *Web Enable Commercial Application Development Using HTML, DHTML, Java Script, Perl, CGI*, BPB publications, 2000.
2. J. Jawoskri, *Mastering JavaScript*, BPB publications, 1999.
3. Margaret Levine Young – *Internet-The Complete Reference- Millennium Edition – TM Edition-1999*.
4. Harley Hahn – *The Internet – Complete Reference – Second Edition-TM Edition*.

## **Covering Paper 4.2 (Web Technology)-**

### **40 Marks List of Experiments:**

#### **HTML (At least 17 assignments has to be done from this group)**

1. Create a HTML document consisting of HTML heading, paragraphs and images.
2. Create a HTML document and insert comments in the HTML source code and insert horizontal lines.
3. Construct HTML document to set the font of a text, size of the font, style of the font.
4. Create a HTML document to show how to create hyperlinks.
5. Create a HTML document to use an image as a link.
6. Create a HTML document to open link in a new browser window.
7. Create a HTML document to jump to another part of a document (on the same page).
8. Create a HTML document to insert images from another folder or another server.
9. Create an image-map, with clickable regions.
10. Create a HTML document with all table elements (Table, Caption, TableRow, TableData element, TableHeadingElement, THEAD, TFOOT, TBODY)
11. Create HTML document to make an unordered list, an ordered list, different types of ordered lists, different types of unordered lists, Nested list, Definition list.
12. Create HTML form with the all FORM elements (text fields, password field, Checkboxes, Radio buttons, Select elements, Drop-down list with a pre-selected value, Textarea (a multiline text input field) and buttons.
13. Create HTML document with all Frame elements (FRAMESET, FRAME, NOFRAMES, and IN LINEFRAME).
14. Create a HTML document to add AUDIO and VIDEO.
15. Create a HTML document to aligning images (Let the image float to the left/right of a paragraph)
16. Create a HTML document to jump to a specified section within a frame
17. Construct a HTML document with CSS to Set the background colour of a page.
18. Construct a HTML document with CSS to set an image as the background of a page.
19. Construct HTML document with CSS to Set the text color of different elements and align the text.
20. Construct HTML document to set different colours to visited/unvisited links, Specify a

background colour for linksXML

21. Construct an XML document that contain information about products of an organization and check the validation of the XML document using DTD.
22. Construct an XML document that contain information of 5 students (such as rollno., name, address, class) and check the validation of the XML document using DTD.
23. Construct an XML document that contain details of 10 books and check the validation of the XML document using DTD. JavaScript (At least 10 assignments has to be done from this group)
24. Write a program in javascript to accept a name from the user and display the same name in an alert box.
25. Write a program in javascript to display a message in a confirm box.
26. Write a program in javascript to display the message "time is running out" in the status bar.
27. Write a program in JavaScript to enter marks of a student and find his/her grade according to the following :if marks >= 90 then grade A if marks >= 80 then grade B if marks >= 70 then grade C if marks >= 60 then grade D otherwise, fail.
28. Write a program in JavaScript to create a button and when the button is clicked the message "Hello World" is displayed on an alert box.
29. Write a program in JavaScript to accept 2 nos. from the user and show the working of all arithmetic operators.
30. Write a program in JavaScript to accept 2 strings and concatenate them.
31. Write a program in JavaScript to display the current date and time.
32. Write a program in JavaScript to find the length of an array.
33. Write a program in JavaScript to check whether a string is palindrome or not.
34. Write a program in JavaScript that responds to a mouse click anywhere on the page (using mouseclick).
35. Write a program in JavaScript to display the contents of a check box in an alert box.
36. Write a program to validate form in the user id and password forms.
37. Write a program in JavaScript to create a welcome cookie, Button animation, Image map with added JavaScript Simple timing, Timing event in an infinite loop. VBScript (At least 8 assignments has to be done from this group)
38. Write a program in VBScript to create a variable.
39. Write a program in VBScript to uppercase to lowercase.
40. Write a program in VBScript to create an array.
41. Write a program in VBScript using conditional statements loop.
42. Write a program in VBScript using loop.
43. Write a program in VBScript to display Date and Time
44. Write a program in VBScript to display the current month and day. ASP
45. Write a program in ASP to interact with a user in a form that uses the "get" method.
46. Write a program in ASP to interact with a user in a form that uses the "post" method.
47. Write a program in ASP to interact with a user in a form with radio buttons.
48. Write a program in ASP to create a welcome cookie.

## BCA.C14.COMPUTER NETWORKS

**Total Marks: 100 (Semester end examination-60, Practical-20 Internal Assessment-20)**

### UNIT-I

Physical Layer: Data communications: components–Network criteria–physical structures – network models–categories of networks–interconnection of networks– internet network Protocols and standards: protocols–standards–standards organizations– internet standards Network models: Layered tasks–OSI model–layers in the OSI model– TCP/IP protocol suite.

### UNIT-II

Digital Transmission: Digital to digital conversion: Line coding–line coding schemes– block coding–analog to digital conversion–PCM–transmission modes: serial transmission – parallel transmission Analog Transmission: Digital to analog conversion: FSK–ASK–PSK Analog to Analog conversion: Amplitude modulation–Frequency modulation– phase modulation Multiplexing: Frequency division multiplexing–Time division multiplexing– Transmission Media Guided media: Twisted pair cable–coaxial cable–fiber optic cable Unguided media: radio waves–microwaves–infrared.

### UNIT-III

Data Link Layer: Error correction and detection: Introduction–block coding– linear block code cyclic codes–checksum. Datalink Control: protocols–simplest protocol– stop and wait protocol–stop and wait automatic repeat request–go back n automatic repeat request– selective repeat–automatic repeat request–piggybacking. Multiple Access: Random access–Aloha–CSMA–CSMA/CD–CSMA/CA Controlled access: reservation, polling, token passing. Channelization: FDMA, TDMA, CDMA.

### UNIT-IV

Wired LANs: Ethernet: IEEE standards, standard Ethernet– fast Ethernet. Wireless LANs: IEEE 802.11–architecture– MAC sublayer addressing mechanism, physical layer–Bluetooth: architecture Bluetooth layers– radio layer–baseband layer–L2CAP– other upper layers. Network Layer: Addressing IPV4 addresses– IPV6 Addresses Internet Protocol: IPV4–IPV6 Address mapping protocols: ARP–RARP.

### UNIT-V

Routing protocols: Unicast routing protocols: distance vector routing, Link State routing Multicast Routing protocols (Anytwo) Transport Layer: Process to process delivery–UDP–TCP Congestion control and QOS: Data traffic–congestion– congestion control–quality of service–techniques to improve quality of service.

## UNIT– VI

Applicationlayer:&NetworkSecurity:DNS: Namespace– domainnamespace–  
distributionofnamespaceElectronic mailArchitecture–  
FILEtransfer:FTPWWWandHTTP:Architecture–webdocuments–  
HTTPNetworkSecurity:Introduction-definitions–twocategories-symmetrickeycryptography–  
traditionalciphers–asymmetrickeycryptography

**SUGGESTED READINGS:** 1. Behrouz A Forouzan,  
Datacommunicationandnetworking, McGraw-Hill, 5th edition, 2011.  
2. DataandComputerCommunication, Stalling W, 5ed, PHI (EEE).

**REFERENCE BOOK:** 1. Andrew S Tanenbaum, Computer Networks, PHI  
publications, 5th edition, 2011.

## DSE-

### 3:SystemsProgrammingTheory:

#### 60lectures

<b>1. Assemblers&amp;Loaders,Linkers:</b>	10L
One pass and two pass assembler, design of an assembler, Absolute loader, relocation and linking concepts, relocating loader and Dynamic Linking.	
<b>2. Introduction:</b>	2L
Overview of compilation, Phases of a compiler	
<b>3. Lexical Analysis:</b>	6L
Role of a Lexical analyzer, Specification and recognition of tokens, Symbol table, lex	
<b>4. Parsing:</b>	10L
Bottom up parsing-LR parser, yacc.	
<b>5. Intermediate representations</b>	10L
Three address code generation, syntax directed translation, translation of types, control Statements	
<b>6. Storage organization:</b>	5L
Activation records, stack allocation	
<b>7. Code Generation:</b>	5L
Object code generation	

#### Reference Books

1. Santanu Chattopadhyaya, *Systems Programming*, PHI, 2011.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, *Compilers: Principles, Techniques, and Tools*, 2<sup>nd</sup> edition, Prentice Hall, 2006.
3. D.M. Dhamdhere, *Systems Programming*, Tata McGraw Hill, 2011.
4. Leland Beck, D. Manjula, *System Software: An Introduction to System Programming*, 3<sup>rd</sup> edition, Pearson Education, 2008.
4. Grune D, Van Reeuwijk. K, Bal H. E, Jacobs C J H, Langendoen K, *Modern Compiler Design*, 2<sup>nd</sup> edition, Springer, 2012

## **SYSTEMS PROGRAMMING LAB**

### **Practical:60lectures**

[1]To implement an assembler for a hypothetical language.

[2]To get familiar with lex: write a program to recognize

numbers, identifiers.[3]To get familiar with yacc:write a desk calculator.

### **DSE-4:Dissertation/Projectwork**

This option to be offered only in 6<sup>th</sup>Semester.

The students will be allowed to work on any project based on the concepts studied in core/elective or skill based elective courses.

The group size should be maximum of three(03)students.

Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.

A maximum of Four(04)projects would be assigned to one teacher.

-----